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ELECTRICAL WORLD

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MAY 9, 1931
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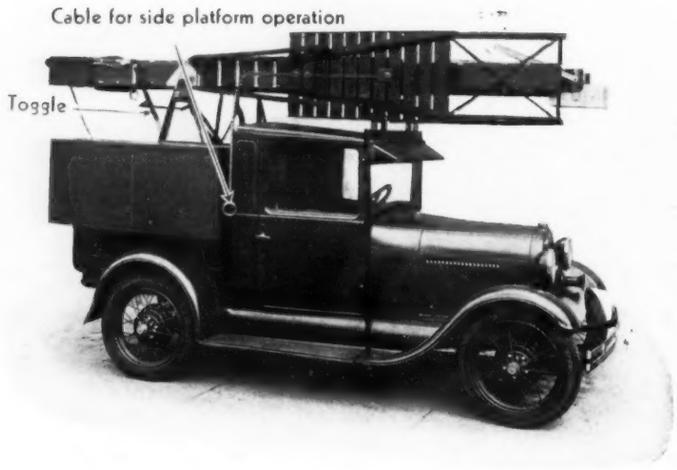

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MAY 9, 1931

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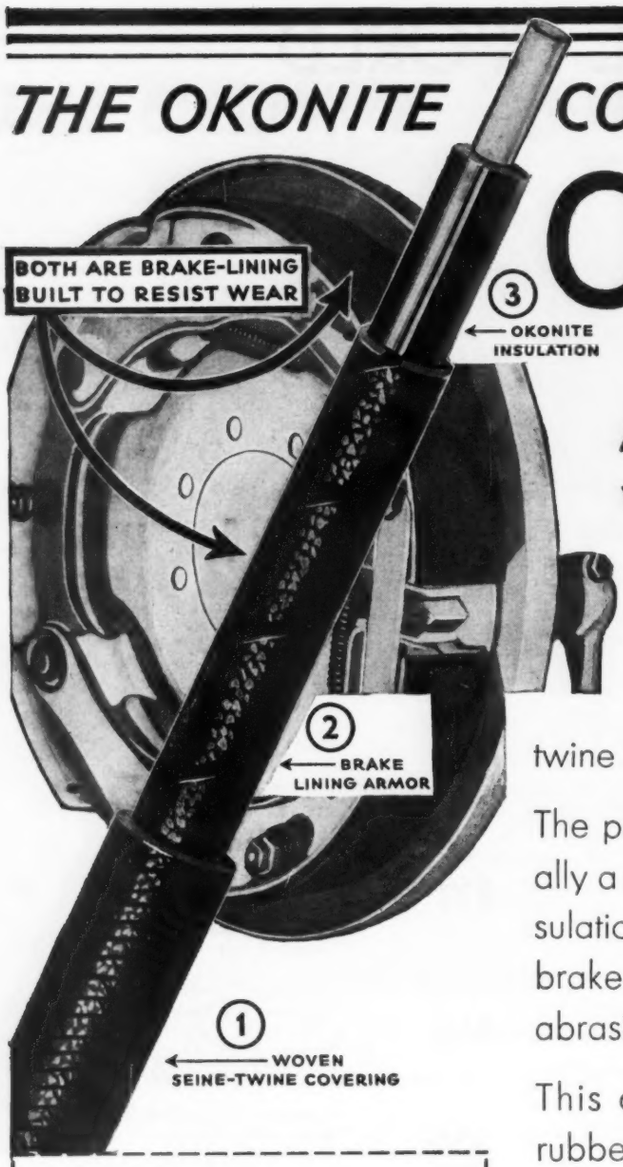

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ELECTRICAL WORLD

for the Week Ending

May 9, 1931

All England's rails may electrify

—**Two-billion-dollar program** suggested in report to British House of Commons advocating complete electrification of main lines as soon as possible. Adequate returns seen. Unemployment aided?—*p. 841.*

—**Pennsylvania hearings warm** as Moore investigating committee learns of 7 per cent of bond issue paid for financing, $32,000,000 difference between rate-making and tax-paying valuations and lost tax refunds—*p. 839.*

Ontario rates to railways attacked

—**Toronto protests energy rates** to city railway as excessive. Failure to meet contract clause of "at cost," no reduction since 1912 and no investigation by commission since 1921 charged—*p. 881.*

-**Utilities support reform move** in Wisconsin which aims at reorganization of state Railroad Commission. Some radical ideas eliminated, but holding-company regulation included—*p. 838.*

New England Power investigation

Federal Trade quiz reviewed, showing a corporate history differing from those developed in earlier investigations. Legal obstacles and hesitancy of investors made financing somewhat complex here—*p. 873.*

—**Harriman justifies policies** of his organization by citing fundamental plans, unification values and community benefits under association plan. New England seen as five or ten years advanced industrially—*p. 863.*

Roosevelt appoints Power Board

Who discovered electricity is anybody's guess. I guess it was some primitive woman, proverbially known for curiosity, who was polishing a string of amber beads on a fur skin. Anyway, the Greeks had a name for it—I mean the amber—it was electron. Now Miss Electron dominates the world. She dances in our vacuum tubes each evening to the tune of Amos 'n' Andy and vibrates in the remotest stars to pique the curiosity of the astronomer.

HARLAN T. STETSON,
Director Perkins Observatory

—**Manufacturers to meet again** at Hot Springs, Va., on May 16. In this issue Messrs. Collens and Berresford of N.E.M.A., Bonnett of Brooklyn Edison and Stephenson of American Bankers' Association discuss business co-operation and economic problems. Planning for future urged as way out—*pp. 848, 851, 853, 855.*

New York State Power Authority Trustees Include Walsh, Bonbright and Cooke

DOUBT as to the personal attitude of Governor Franklin D. Roosevelt of New York on power development and utility regulation, had any existed, would have been removed by the announcement made by him late Wednesday afternoon of his appointees to the board of trustees of the State Power Authority set up by the Legislature to supervise construction, financing and operation of the projected state hydro-electric plant to be built at a cost of $171,000,000. These appointees, three of whom have been aligned with what may be referred to as the radical group of experts or commentators on power questions, are:

FRANK P. WALSH, lawyer, New York City.

Prof. JAMES C. BONBRIGHT, School of Business, Columbia University.

MORRIS LLEWELYN COOKE, described in "Who's Who" as a "consulting engineer in management," Philadelphia.

FRED FREESTONE, Interlaken, N. Y., master of the New York State Grange.

DELOS COSGROVE, lawyer, Watertown, N. Y.

Mr. Walsh and Professor Bonbright were members of the legislative commission that two years ago investigated the laws governing regulation in New York and were instrumental in preparing the minority report and bills of that commission. Mr. Cooke has long been a supporter of Governor Pinchot's utility program in Pennsylvania and was the director of the "giant power" survey made in that state for Mr. Pinchot during his first term as Governor. The views of Mr. Cosgrove and Mr. Freestone are not so widely known, though the practice of the former is said to have put him in close contact with water-power problems.

No member of Governor Roosevelt's St. Lawrence Power Development Commission, whose report led to the establishment of the Power Authority, has been made a member of the new body. It will be remembered that this commission's report was conservative in nature and favored the sale of the power generated to light and power companies for distribution by the latter over existing lines, if a satisfactory contract could be made, rather than the building by the state of a competing transmission system. This report was at first said to be displeasing to the Governor, but its conclusions were finally accepted by him.

Under the Power Authority law it will be necessary for the trustees to bring back for legislative sanction a comprehensive plan for the St. Lawrence project. Not only must this be approved but the difficulties connected with co-operation with the Federal Power Commission on the one hand and the Canadian and Ontario governments on the other must be overcome before bonds are floated or work begun.

The men named by the Governor are recess appointees. They will serve respectively for one, two, three, four and five years if confirmed by the Senate. In some quarters it is contended that, since there can be no vacancies on a board not organized, the appointments will not be legal without and until Senate ratification according to the terms of the Cornaire act.

▼

Plan Reorganization of Wisconsin Commission

REORGANIZATION OF THE Wisconsin Railroad Commission as the Wisconsin Public Service Commission with largely increased powers is virtually assured as the result of an agreement following conferences between the Railroad Commission and representatives of the public utility companies. These have resulted in amendments to the bill of Senator Thomas M. Duncan (Socialist) noted in the ELECTRICAL WORLD for April 18 (page 708). The joint legislative committees considering this bill were told by Theodore Kronshage, chairman of the Railroad Commission, that changes suggested by the utilities were found constructive, satisfactory and workable.

The revised proposal, although less strict than in its original form, will still probably give Wisconsin the most stringent public utility regulation measure in the Union. The bill, as it now stands, gives the commission wide power over every phase of public utility activity. It will have jurisdiction over arrangements between Wisconsin utilities and holding companies. It will control the issuance of utility securities more thoroughly than ever before, one provision being that the commission, if it finds the capital of a utility impaired, may direct the utility to cease paying common-stock dividends until the impairment has been made good. No utility may pay common-stock dividends except out of earnings left after taking care of depreciation. Cost of investigation is to be borne by the utility investigated, and general cost of administration is to be assessed against the utilities in proportion to their gross operating earnings. Jurisdiction is given to the commission over installation of new property, construction or abandonment of service, as before.

One of the important changes made as a result of the conferences strikes out the provision that all directors of public utility corporations must be residents of the state. Another change provides that the commission, in aiding utilities to arrive at their correct depreciation reserve, "shall give consideration to the experience of the utility in accumulating a reserve under previous rates, the retirements actually made and such other factors as may be relevant." It is provided also that in court review of a commission order evidence other than that originally considered by the commission may be submitted to the court.

This measure for stricter regulation will, it is hoped, stave off passage of any more bills in the direction of public ownership.

▼

SMOKESTACKS OF MODERN RUSSIA

—*Wide World Photos*

Where there is so much smoke there must be service. The chimneys belong to the Tcheliabinsk electric generating station, near the Siberian border.

North American Company Probe to Begin May 12

SESSIONS OF THE Federal Trade Commission devoted to its examination of public utility companies will be resumed on May 12, when an inquiry into the North American Company will be begun. The hearing is likely to run for a week or longer. No hearings have been held in this inquiry since the New England Power Association examination was closed in March.

Power and Regulation in State Legislatures

ALABAMA.—Representative Edgar has introduced a bill to impose a tax of 1 mill per kilowatt-hour on all electrical energy, hydro or steam, generated in the state, including power exported. At present hydro power pays a tax of 0.4 mill. Mr. Edgar estimates that his measure would increase revenue from this source from $1,000,000 to $5,000,000.

CALIFORNIA.—The resolution to amend the state constitution so as to provide for taxing publicly owned utilities was defeated in the Assembly by 56 to 15. A recommendation made by the Assembly committee on constitutional amendments to permit cities owning and operating their own utilities to issue bonds by a majority instead of a two-thirds vote was defeated in both houses.

COLORADO.—The Legislature has adjourned. Among proposals which came to nothing was one to place a tax (amount never specified) upon kilowatt-hour consumption of electricity.

FLORIDA.—Florida would collect $2,500,000 in taxes annually from electric light and power plants, except those municipally owned, under the terms of a general revenue bill before the Legislature. It is also proposed to impose the heavy tax of one-half cent per kilowatt-hour on consumers of electricity.

MASSACHUSETTS.—The Legislature has killed the Birmingham bill placing holding companies under commission regulation, by a vote of 104 to 89. The bill relaxing restrictions under which cities and towns may undertake municipal ownership in competition with utilities has also been killed. All the bills aimed against the utility companies this session have failed.

PENNSYLVANIA.—Friends of the bills to set up a Fair Rate Board in place of the Public Service Commission, passed by the Assembly and now before the Senate, were heard on Wednesday of this week before the judiciary general committee of the Upper House and opponents will be heard next Monday. It is generally believed that the bills have a slim chance of passing the Senate even if the committee reports them. Governor Pinchot has announced his intention of appealing directly to the people by speech-making and radio in the constituencies of nine of his senatorial opponents. A brief report of testimony of utility men before the House committee is printed below.

SOUTH CAROLINA.—On May 1 the Senate and the House both voted for a kilowatt-hour tax of 0.5 mill on all electric power generated or sold. This action follows the previous rejection of similar measures on two occasions. It is now in the Governor's hands.

WISCONSIN.—The Loomis bill, permitting the formation of publicly owned power districts, has become a law through its signing by Governor La Follette. Under the old statutes a city could own and operate utilities, but operation was confined to its own borders. Under the new law cities can combine and form large publicly owned utility districts. The administration measure to permit municipalities to compete with privately owned utilities without obtaining permission of the Railroad Commission has passed the Assembly by 74 to 9. It is expected to encounter opposition in the Senate. A state utility counsel to act as agent and adviser for persons or municipalities in all matters affecting service or rates which are within jurisdiction of the Railroad Commission is provided for in a bill offered by Senator Loomis. A drastic measure to amend the corrupt practices act, and which the utilities believe is aimed at them, creates a new offense which would make it a violation of law, punishable possibly by dissolution, for any Wisconsin corporation to influence "legislation of any kind, or to promote the candidacy of any person for nomination, appointment or election to any political office, or in support of or in opposition to any constitutional amendment, legislative measure or other question submitted to a referendum vote of the people." This bill, introduced by Assemblyman J. W. Carow, has passed the Assembly by a vote of 67 to 13 and is before the Senate. The bill, it is maintained, would prevent any utility corporation from presenting arguments on its side should a town decide to have a referendum on utility questions. Newspapers throughout the state are fighting it as "gag" rule which would apply to them as well as to the utilities. The Duncan bill to extend the powers of the state regulatory commission is noted on page 838.

▼

Utility Men Testify at Pennsylvania Inquiry

TWO HIGH OFFICERS of the Pennsylvania Power & Light Company—P. B. Sawyer, chairman of the board, and John F. Wise, Jr., president—and C. S. Mitchell, controller of the Duquesne Light Company, testified at no little length in the utility investigation of the House committee at Harrisburg on April 30. A few of the "high spots" in their testimony, or what were so considered by the antagonists of the utility companies, are touched on below.

Mr. Sawyer explained the company's financing and told of the acquisition of 95 small companies in eastern Pennsylvania within three years. He said that the four banking-house underwriters of his company's recent bond issue of $121,000,000 received $8,500,000 as their payment for floating the bonds.

Mr. Wise said that his company in 1930 paid to the Electric Bond & Share Company for general management service 1.2 per cent of the gross revenue, or $458,318. In addition, he said, the Electric Bond & Share Company was paid $145,000 for supervising $3,650,000 worth of construction work. He testified also that the Pennsylvania Power & Light had paid $1,450,000 for the Panther Valley Electric Company in 1926, a price attacked by the committee's counsel as excessive. Mr. Wise also gave evidence on rates.

Mr. Mitchell testified regarding "intangibles" in the valuation of the Duquesne Light Company as involved in a difference of $32,000,000 between the figures presented for rate making and those for tax paying. He said the report to the Revenue Department had not reduced the amount of capital-stock tax due the state. It was brought out that

BROOKLYN BRIDGE ELECTRIC CABLES SUPERSEDED

—Wide World Photos

Here go forever three lead-sheathed 6,600-volt cables that have connected the generating stations of the New York and Brooklyn Edison companies for 30 years. They have been superseded by 27,000-volt and 33,000-volt cables carried in a subway tunnel.

▼

the company for 1917 to 1923 received a refund of federal income tax amounting to $1,137,000, which was placed in the surplus account. Committee's counsel contended that the ratepayers should have received the benefit.

Major J. S. S. Richardson testified at length in an examination on the utilities' relations to textbooks and similar matters along the lines followed so assiduously by the Federal Trade Commission. The Pennsylvania Electric Association sent word that since the committee had already announced definite conclusions nothing that association men could say would be of constructive worth. The committee adjourned until Thursday, May 7, and agreed to conclude taking evidence on the following day.

▼

Special Contracts to Be Investigated in New York

THE FIRST HEARING of several which will cover special contracts for electric service and gas entered into between public utility companies in New York State and private consumers will be held by the Public Service Commission on May 14, when companies in the metropolitan district will be investigated to determine whether such special agreements are in any way contrary to the law or are "unreasonable, improper, unduly preferential or unjustly discriminatory." Only about 60 such contracts have been filed by New York City and downstate utilities, and only a few of these affect districts within the city's boundaries. There are thought to be more upstate.

On the preceding day the commission will investigate the practice of imposing a fine for failure to pay bills promptly, the Corporation Counsel of Buffalo having complained against the rules of the Buffalo General Electric Company in this regard. Together with the inquiry into the matter of unissued securities (noted on page 882), this makes three new investigations launched by the New York Public Service Commission.

▼

Seattle Council Confirms Successor to J. D. Ross

DESPITE THE RESOLUTION passed by it in March, following the dismissal of J. D. Ross as superintendent of the Seattle municipal light department, that it would confirm no appointee to the post other than him, the City Council on May 4, by a vote of five to four, confirmed W. Chester Morse. Mr. Morse, Mayor Frank Edwards' second appointee, heretofore had been rejected by a vote of six to three, and the favorable vote came as a complete surprise to supporters of Mr. Ross.

Mayor Edwards had named seven men to fill the superintendent's position before one was found acceptable by a majority of the Council. Mr. Morse was formerly city engineer under the Bertha K. Landes administration.

▼

Regularizing Employment Is Vital, Says Swope

NECESSITY OF ASSURING and regularizing employment during depressions was the keynote of an address by Gerard Swope, president of the General Electric Company, before the plenary session of the congress of the International Chamber of Commerce held in Washington this week, following the annual gathering of the Chamber of Commerce of the United States, which met there last week. Employees have not been so carefully considered and planned for in advance as have materials and production programs, Mr. Swope said, adding:

It is comparatively recently that industry has begun to consider other aspects of this problem. Never before in economic crises has there been such an awakened civic consciousness, not only from the standpoint of the community but also industry, in the recognition of this responsibility, which makes one hopeful that as a result of all this thought and experiment better methods of study, analysis and approach, and finally the solution of this serious problem, will be found.

▼

EASTWARD THE COURSE OF FLOODLIGHTING—

Here is the monument to the Filipino patriot Rizal, at Manila, lighted by G.E. combination flood- and street-lighting luminaires.

New Suit Over Torchio Cable-Joint Patent

AS A RESULT of the situation regarding the validity of the so-called "oil-filled cable joint" patent (No. 1,172,322), issued to Philip Torchio in 1916, the Electric Cable Joint Company, owner of the patent, filed suit on April 23 in the United States Circuit Court for the Second District of New York against the Brooklyn Edison Company, which it charges with infringement. The complications that have arisen over this patent and which are interesting light and power companies in all sections were recounted on March 7 (page 437).

▼

Engineers at Rochester Plan Mitigation of Noise

NOISE, TRUE TO ITS NATURE, caused some confusion at the convention of the Northeastern District of the American Institute of Electrical Engineers at Rochester, N. Y., April 29 to May 2. Its isolation or mitigation was a chief subject of discussion, and the unhackneyed and comprehensive topic brought out animated views not only from the members of the Institute but from engineers of other bodies meeting with them and representing the National Electric Light Association, the National Electric Manufacturers' Association, the American Society of Mechanical Engineers, the American Telephone & Telegraph Company and the acoustical engineers.

The confusion, purely in the matter of mutual comprehension of course, arose from the widely different systems of measurement which had been attempted by the different kinds of engineers, with the consequent variety of meters, so that values found expression in figures that ranged from small decimals and negative indices to large positive integers in which geometric progression played a part. This symposium, which included seven papers on which the discussion was based and which foreshadowed the rapid growth of engineering efforts to combat one of the evils modern civilization has brought with it, will be reported in some detail in an early issue.

Another session dealt with the more familiar problem of lightning, and in this discussion progress in the protection of transmission lines was reported by engineers connected with the Public Service Electric & Gas, Pennsylvania Power & Light, American Gas & Electric, Consumers Power, General Electric and Westinghouse companies. F. W. Peek, Jr., went so far as to predict the complete immunity of transmission lines in the not remote future.

The two sessions referred to above

were those of Thursday and Friday respectively. On Wednesday selected subjects to the number of eight were treated by well-known technical professors, power-company men and manufacturing-company engineers.

President William S. Lee in his opening address urged the public at large to guard against political encroachments which might "destroy or minimize" the results of the "great initiative" of electrical engineers and executives, saying:

"The production of electricity and the manufacture of apparatus for its generation, transmission and use enter into the livelihood of virtually every activity of our entire people. They are interwoven in our banking, investing and savings system. I do not believe that the public will allow any section, community or individual, for their own aggrandizement, be it financial, political or personal, to injure the legitimate development of the electrical industry."

The convention dinner, the students' session and the sightseeing and inspection trips were carried out with the customary enthusiasm, and the attendance was good.

▼

Water-Power Development Still Sought in Oregon

INDICATION THAT THE construction of major hydro-electric projects in Oregon is not to be abandoned altogether as the result of political agitation lies in the fact that several applicants for permits and licenses involving large developments have filed requests with the State Engineer for authority to transfer their applications from the office of the Reclamation Commission to that of the new Hydro-Electric Commission.

Among requests of this kind are one from the Columbia Valley Power Company of Seattle, which wants to develop 235,000 hp. on the Columbia River, at Cascade Locks on the Oregon shore, at an estimated cost of $15,000,000; several from O'Neil & Callahan, San Francisco, which involve the development of 7,756 hp. on the Santiam River; one from L. Houghtaling of Portland for 3,432 hp. on Rock Creek; others from C. H. Lee and R. W. Myers of Oakland, Cal., for an eventual development of 400,000 hp. on the Illinois and Rogue Rivers, and one covering the J. G. Kelly holdings on the North Santiam River and at Marion Lake and involving the development of approximately 69,590 hp. The last-mentioned applications were for a time on file in the name of the Northwest Power Company, subsidiary of the Portland General Electric Company, but were relinquished by that utility when the state recognized the prior rights of the city of Salem.

Westinghouse "Deïon" Lightning Arrester

APPLICATION OF THE "Deïon" principle to lightning-arrester construction has been made, and this week J. J. Torok demonstrated at the Westinghouse laboratory in East Pittsburgh that a new protective device for transmission lines, offering definite technical operating and economic advantages, is on the way toward commercial availability.

Subjected to an artificial lightning stroke of 132,000 kva., this small hollow tube "lightning rod" acted in one five-hundredth of a second, according to Mr. Torok. "We hope it will effect great economies in the forms of flashover protective devices now in service to protect insulator strings on overhead transmission lines which supply cities with light and power," he said. "In addition, it is expected to provide permanent protection against the ravages of lightning and save millions of dollars."

▼

3,000,000-Kva. Breakers on Eastern Network Tested

FOR THE 220-KV. NETWORK which ties together Conowingo, Wallenpaupack and New Jersey Public Service transmission lines, oil circuit breakers rated at 3,000,000 kva. at 220 kv., and really capable of working at 250 kv. or more, were installed last summer, to the number of six, at the Roseland station of the New Jersey company. In this area, 15 miles from Newark, what is possibly the heaviest block of power fed into any 220-kv. system is found. No interruption of service from lightning or other surges has occurred since the breakers were installed, and all short circuits have been cleared with the expected rapidity.

An opportunity to check the performance of one of these breakers recently presented itself while opening short circuits deliberately caused on the line between Roseland and the Plymouth Meeting station of the Philadelphia Electric Company. During the maximum-current tests the breaker opened 1,700 amp. to 1,900 amp. in not over 7.5 cycles (0.125 second.)

▼

Aftermath of Ouster Order in Missouri

FOLLOWING THE OUSTING from Missouri of the Electrical Protective Association (ELECTRICAL WORLD, April 25, page 750) the Electrical Workers' Union of St. Louis has demanded that electrical contractors sign a new working agreement providing for the payment of the present wage scale of $16 a day, $2.80 of which will be used to pay for insurance for members of the union. With the exception of the substitution of a board of trustees for the association the agreement submitted is the same as the old contract. Fifty-five signatures are said to have been obtained.

The Associated Electrical Contractors, a new group of 26 independent electrical contractors, has announced that it will not enter into the new agreement with the union on the ground that it violates the ouster order. Attorney-General Stratton Shartel is investigating the agreement to determine whether it constitutes contempt of the Missouri Supreme Court.

▼

Plan Two-Billion-Dollar British Electrification

A VAST SCHEME for contributing to Britain's industrial prosperity has been presented to the House of Commons by the Weir committee on railway electrification. The committee recommends that the entire national railway system should be electrified in the next fifteen years at a cost of $2,000,000,000, providing continuous employment for 60,000 men.

Measured against proposals of such magnitude, the extent to which electrification has so far been carried by British railroads is very small. Of the 51,000 miles of single track in Britain, only 1,300 miles have been electrified. Of late years progress has been quick-

ened, but it has been almost wholly confined to suburban lines, which on account of their heavy and frequent traffic can be electrified more profitably than main lines. Of the four British main lines, the only one where electrification has been embarked upon is the Southern Railway system connecting Brighton, Hove and Worthing with London.

▼

Suit Is Begun to Oust Chairman of Power Board

FIRST STEPS IN THE TRIAL of the United States Senate's suit to oust George Otis Smith from the chairmanship of the Federal Power Commission were taken on May 4 by the filing in the District of Columbia Supreme Court, through United States Attorney Leo A. Rover, of an application for a writ of quo warranto. John W. Davis and Alexander J. Groesbeck, special counsel for the Senate, prepared the papers in the case, which recited the incidents leading to the confirmation and subsequent reconsideration of the nomination of Dr. Smith and asked that he be compelled to show by what warrent he holds his office and if it be found he holds it unlawfully that he shall be ousted.

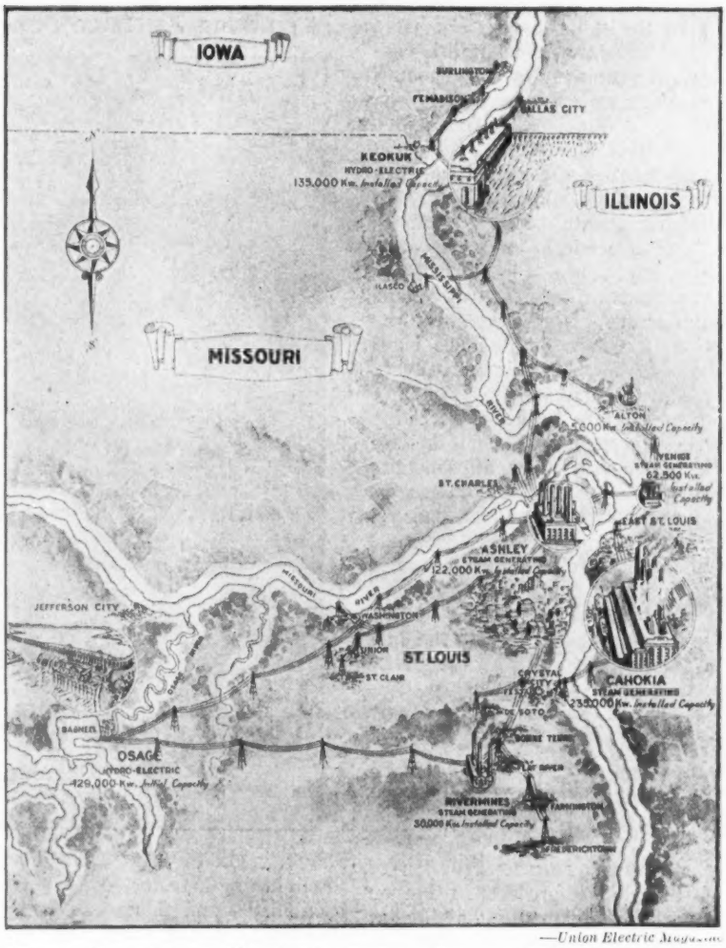
▼

Electric Sign Load Only Half What It Might Be

AN ELECTRICAL ADVERTISING SURVEY by an N.E.L.A. subcommittee set up for that purpose has just been made the subject of a report signed by the committee's chairman, W. J. Moore of the Society for Electrical Development. The survey, Mr. Moore says, shows clearly that electrical advertising in the United States has not yet reached 50 per cent of saturation. Covering a territory containing 30 per cent of the commercial meters in the country, the survey disclosed that the saturation point in important cities ranges from one and a half commercial meters per electric sign to 70.

The questionnaire issued by the subcommittee showed slightly more than 200,000 electric signs among the firms reporting and an average number of commercial meters reaching 5.09 per sign. These returns cover 125 cities of all sizes and types and in every part of the country. The central-station revenue actually received is somewhere between $48,000,000 and $60,000,000, and the value of the signs manufactured in the United States lies, by a coincidence, between the same two totals. There is a probable annual loss of revenue to light and power companies of $9,000,000 to $16,000,000 due to the failure to maintain the signs efficiently.

LINKING THE OSAGE AND THE MISSISSIPPI ELECTRICALLY



—Union Electric Magazine

When the thirty-million-dollar hydro plant under construction at Bagnell, Mo., for the Union Electric Light & Power Company of St. Louis goes into service this summer that company's interlinked steam and hydro system will take on the still greater proportions graphically indicated above.

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Berlin Agrees to Sell Her Municipal Utilities

PRESS DISPATCHES say that a new plan for the sale of Berlin's municipal electric light and power properties to an international banking syndicate has been tentatively accepted by the Berlin municipal authorities. Negotiations for the reorganization of the Berlin City Electric Company have been going on for some time, and the agreement reached came just as the option granted to this banking group was about to expire. Under its terms the city will receive approximately $132,000,000 and $7,000,000 in the preferred stock of the new reorganized utility company. In addition it will receive about 50 per cent of the eventual excess profits. The assets acquired by the banking group will be transferred to a new company, the Berlin Power & Light Corporation.

With the American principals in the offer, Harris, Forbes & Company and the J. Henry Schroder Banking Corporation, are associated the International Power Securities Corporation, organized and sponsored by Aldred & Company; the United States & Overseas Corporation; the Standard Investing Corporation and the W. A. Harriman Securities Corporation, both affiliates of Brown Brothers, Harriman & Company; the American, British & Continental Corporation and others.

The foreign participants in the deal, it is said, are headed by the Prussian Electric Company, which is owned by the State of Prussia, and the Elektrowerke, which is owned by the German government.

Harris, Forbes & Company of New York are quoted as saying that the Berlin City Electric Company sells about 90 per cent of the electrical energy supplied in Berlin and that the transaction would be one of the largest international financial deals yet made.

Scattered Happenings in the Electrical Sphere

UNITED STATES

Washington's Rate Agitation Goes On

Public hearings on the present adjustable rate scale of the Potomac Electric Power Company are to be held by the Public Utilities Commission of the District of Columbia, which is trying to bring about a reduction below the 1931 rate of 4.2 cents per kilowatt-hour.

Credit Men Prepare Program

Among those who will address the thirty-third annual convention of the National Electrical Credit Association, to be held at the Hotel Pennsylvania, New York, May 21 and 22, are A. D. Whiteside, president R. G. Dun & Company; R. W. Lawrence, president Bankers' Commercial Security Company; Frank E. Watts, who will speak on "Trends of Electrical Distribution"; F. A. Lind, who will discuss new Sherman law developments affecting trade associations; G. D. Munger, whose topic is contractor-dealer problems, and W. W. Orr, who will advocate comity between trade associations. The banquet on Thursday evening will be addressed by Marc A. Rose of the *Business Week* and T. C. Sheehan, Jersey City. J. H. Lecour is president of the association.

Kansas N.E.L.A. Has One-Day Session

J. F. Owens of Oklahoma City delivered a "funeral eulogy," as he termed it, on "Merchandising and Public Relations" at a one-day convention of the Kansas Section, N.E.L.A., held at Wichita on April 30, his phrase being suggested by the fact that both Oklahoma and Kansas have now anti-merchandising laws. Three hundred delegates assembled for round-table and other sessions. New officers are: President, H. S. Kilby, Salina; first vice-president, C. W. Amidon, Lawrence; second vice-president, E. Bell, Manhattan; third vice-president, F. H. McCullough, Wichita; treasurer, P. F. Gow; secretary, Mrs. L. M. Jacoby.

First Oregon New-Law Plan Rejected

Upon the advice of the Attorney-General, the Oregon Hydro-Electric Commission has refused to accept for filing the petition for the formation of a public utility district in Bay City, Tillamook County. The petition is said by the legal department to be faulty, and the commission holds that the utility district law does not become effective until June 6.

Power Plan Proposed to Los Angeles

The Los Angeles Department of Water and Power has received an offer from the Densel Company of Utah, coal operator, to build a twenty-million-dollar steam-electric generating plant in Los Angeles to provide the city with power for a 20-year period at 5.7 mills per kilowatt-hour. At the end of that time ownership of the plant would be transferred to the city. The city would be asked to guarantee to use 2,000,000 kw.-hr. a day for the period.

Vacuum-Tube Suit in Supreme Court

Argument has begun in the United States Supreme Court in the De Forest Radio Corporation's suit to invalidate the Langmuir tube patents of the General Electric Company, which has been heard three times in lower federal courts, two decisions being in favor of the plaintiff and one (the latest) in favor of the defendant.

226,000-Kva. Poughkeepsie Substation

A late detail of the Niagara-Hudson system's coming tie-in with the New York Edison system, to be finished this year, is that the transformer substation to be built at Poughkeepsie will have a rating of 226,000 kva., making it one of the very largest of its type. Eight 110-kv. and two 132-kv. transmission lines will center there.

Connecticut Attorney-General Moves

A motion has been made by the Connecticut Attorney-General in the Superior Court to bring about the removal of the Public Utilities Commission of that state for failure to enforce the grade-crossing-removal law. The action is the outcome of the charges brought by Prof. Albert Levitt of Redding against the commission. The case will be called for hearing later.

Another St. Louis Rate Cut

A new tariff of commercial power rates has been filed with the Missouri Public Service Commission by the Laclede Power & Light Company of St. Louis. It permits a change in classification for 25 large customers with three-year contracts and a demand of at least 150 kw.-hr. monthly. They will save approximately $45,000 a year.

Compensation Figures at Los Angeles

Testimony presented at a hearing before the California Railroad Commission in Los Angeles on the question of the compensation to be paid by that city for electrical properties of the Southern California Edison Company in certain annexed districts brought out estimates varying from $4,800,000 to $6,245,927, including severance damages. The hearing was adjourned until June 9.

Owatonna Finally Keeps Plant

After refusing and then reconsidering the proposal of the People's Power & Light Company of St. Paul to buy the municipal electric and heating plant for $700,000, the City Council of Owatonna, Minn., has rejected the offer.

Omaha Has New "White Way"

Fifteen thousand people turned out recently in Omaha, despite unpleasant weather, to see the celebration that marked inauguration of the city's new "white way," extending from the Union Station along Tenth and Farnam Streets.

CANADA

Shawinigan Pushes St. Maurice Plans

Work on the construction of the Rapide Blanc development on the Upper St. Maurice River, in the Province of Quebec, which the Shawinigan Water & Power Company started last year, is well advanced. The Rapide Blanc is one of several developments to be undertaken over a long stretch of the Upper St. Maurice by the Shawinigan company under a 75-year lease entered into with the Quebec government. The approximate head will be 110 ft. and the initial installation, it is estimated, will produce 160,000 hp. at a cost exceeding $18,000,000.

ABROAD

Long-Term Electrical Credit

Great impetus is said to have been given to the British electrical industry by the application of a long-term credit sales and distribution scheme to all kinds of installations from those for a small private dwelling to those for a large factory. The consumer pays for his equipment on the installment plan over an agreed-upon period, while the contractor is paid immediately.

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Coming Meetings

East Central Division, N.E.L.A.—Deshler-Wallick Hotel, Columbus, Ohio. May 11-13. D. L. Gaskill, 603 Broadway, Greenville, Ohio.

National Fire Protection Association—Royal York Hotel, Toronto, May 11-14. Chairman electrical committee, A. R. Small, 109 Leonard St., New York.

National Electrical Manufacturers' Association—Hot Springs, Va., May 18-23. A. W. Berresford, 420 Lexington Ave., New York.

Middle West Division and Nebraska Division, N.E.L.A.—Excelsior Springs, Mo., May 20-22. Thorne Browne, 1527 Sharp Bldg., Lincoln, Neb.

National Electrical Credit Association—Hotel Pennsylvania, New York, May 21 and 22. F. P. Vose, 1008 Marquette Bldg., Chicago.

National Electrical Wholesalers' Association—Hot Springs, Va., May 27-30. E. Donald Tolles, 165 Broadway, New York.

Wisconsin Utilities Association—Accounting Section, Racine, May 28-29. J. N. Cadby, 135 W. Wells St., Milwaukee.

National Electric Light Association—Atlantic City, June 8-12. A. J. Marshall, 420 Lexington Ave., New York.

Public Utilities Advertising Association—New York, June 14-16. Room 1748, 4 Irving Place, New York.

Association of Iron and Steel Electrical Engineers—Cleveland, June 15-19. J. F. Kelly, Empire Bldg., Pittsburgh.

Canadian Electrical Association—Banff Springs Hotel, Banff, Alberta, June 16-18. H. M. Lyster, 407 Power Bldg., Montreal.

American Institute of Electrical Engineers—Summer convention, Asheville, N. C., June 22-26. F. L. Hutchinson, 33 W. 39th St., New York.

Pacific Coast Section, N.E.L.A.—Del Monte, Calif., June 24-27. K. I. Dazey, 447 Sutter St., San Francisco.

Caterpillar Tractor Company

Cable laying mechanically

Spring . . . and out-of-door construction work in full sway.

With the gesture of a giant hand sweeping earth back to refill where trench-digging machines have prepared the way for underground placement of conductors, this tireless little tractor is doing mechanically and easily that which would otherwise have required many hands and many more dollars.

This is a view along the Golden State Highway near Fresno, Calif., where not only working economies count but minimum obstruction to an intensely used roadway is at a premium.

EDITORIALS

L.W.W.MORROW
Editor

Business forum fails

THE most significant happening of recent date was the meeting of the Chamber of Commerce of the United States last week. This organization is the only one to represent all American business and it met at one of the most critical periods in business history. What were the results?

Candidly speaking, American business failed to measure up to its opportunities. It produced nothing but glittering generalities and individual company experiences. It put forth no plan for business stabilization. It suggested no means for meeting unemployment. It dallied weakly with the functions of government in business. It failed to meet the challenge of Secretary Lamont when he said the government had done all it could and business must help itself. It was weak-kneed on wage standards, on credit expansion, on the tariff, on price stabilization and on any analysis of what was the cause of the depression or what would prevent or minimize its recurrence.

Measured in perspective, American business made a poor showing in its business forum. It failed even to approach the efficiency of the government in trying to help the business situation. America waited for business to speak and to plan and to act. It waited in vain.

Responsibility for national policies

WHEN the war was over the most vital of all issues was whether government should continue its wartime ownership and operation of many agencies of production and distribution. The decision was to go back to our fundamental conception of government and of the rights and responsibilities of the individual.

Again there is a revival of proposals that the government conduct commercial business and that our American system be abandoned for a socialized conception of the relations of government to business and to the individual. These proposals arise because the business depression has created an unrest readily capitalized by radical leadership. The decision to be made therefore is: Shall the present American political and economic system be discarded — the one that has enabled us to advance beyond the rest of the world—in order to adopt principles and methods destructive of its very foundations?

No discussion of conditions in the electrical industry can be had without considering the influence of this world-wide battle between socialization and individualism. It is the issue upon which thought and action must be focused. It pervades the business atmosphere and influences business policies and practices. To its solution industry must contribute.

Both the utilities and the electrical manufacturers can do their part in convincing the body politic of the merits of our system and the demerits of socialization if in the formulation of their policies and in the conduct of their business notice be taken of present political and economic trends.

The roads to better business

IT IS encouraging to note that electrical manufacturers have faced the business depression with less demoralization than in any previous similar period. All suffered a loss in business volume, and a decrease in profits was rather general, but destructive price cutting, wage cutting and unemployment were at a minimum. Articles in this issue by several manufacturers, a banker and a purchasing agent show that the depression has brought to the front some very thoughtful plans for an improvement in the industry.

Attention is focused upon market studies, economical ways to reach the markets and the development of group effort to supplement individual effort. Markets are only half saturated, and all parts of the electrical industry are interested in studying the markets in detail. This can be done by individual utilities, manufacturers, wholesalers and retailers, and each of these units can then study how best and most economically it can function as a commercial enterprise in selling its products or services to its markets. But in addition to individual applications of sound market analysis and sales principles there is need for group effort. The general industry policies, statistics, ethics and practices are beyond the power of individual enterprises to establish for an industry branch.

Undoubtedly the trade association can and should operate with a new conception of what it should do and with more competency and power. It should become the business research organization, the statistical clearing house and the mechanism for putting forth policies and controls that will aid an industry branch to function most economically and effectively. In addition, it is the unit of business that can do the co-operative work necessary to industry branches if markets are to be developed quickly and efficiently and if industry is to operate with a united front in its approach to the markets. Planning and analysis by individual enterprises and team effort through the agency of the trade associations are the roads to better and more stable business for the electrical industry.

What is the measure of satisfactory customer contacts?

"THERE are no bad spots in our customer contacts." Almost any utility executive will say that, sincerely. He will concede in all probability that the national relationships of the electric utility industry are strained disappointingly in some instances, but he will stoutly maintain that "the local situation is licked." It is only partially licked merely because there are no complaints about bills, service or employee contacts. It can be wholly licked only if the consuming public has no smoldering, possibly unvoiced resentment against utility men, company or treatment. Do such Elysia exist?

One of the difficulties which large corporations experience, be they purveyors of merchandise, transportation, entertainment or service, is to know the facts about public good will. By far the best of judicious expenditures might well be the appointment of an adequate number of high-grade employees as "surveyors of service" in each community—those whose integrity, impartiality and sense of customer values are beyond reproach and who would have the necessary authority to carry demands for better service to the highest executive in the company if need be. Employees being what they are, customers being what they are, and human nature being what it is, there can be scarcely a business organization in the country that would not benefit manyfold through the efficient and conscientious "shadowing of service" by surveyors whose authority and judgment were worthy of so important a task.

Exceptional problems demand exceptional solutions

TO THE layman what could be simpler than to "tap" a high-powered, supervoltage transmission line for local needs? None the less, a far-reaching principle of great economic interest is involved in problems of this class whether they arise in the operation of a trunk-line railroad, power company, long-distance telephone system or a wholesale business organization. The principle emphasizes the increased cost of breaking into an established large-scale cycle of activity for an object out of line with the major purpose of the enterprise.

Recently the question arose of maintaining local service for company use at a mid-point switching station on a 220-kv., 75,000-kw. line more than 125 miles long. The power company required about 200 kw. for the charging of batteries, repair facilities, lighting, pumping and other small power uses at the site. At present the local market does not justify the installing of transformer equipment at this point, and the cost of breaking into the line for company needs appears too great to be attempted. Moreover, the line forms a major link in a regional interconnection of high importance, and continuity of service is so vital that the designing engineers have been

forced to minimize all complications in the way of connected apparatus.

The indicated solution seems to be either to purchase power from another organization through whose territory the trunk line passes or else to install a small isolated internal-combustion generating plant and let the 220-kv. energy speed on its way rejoicing. The designing engineers on this project speak of the second alternative with a wry smile, but the unconventional proposal should not lead one to question the engineering integrity of the suggested course. The situation may be a little unusual, but it furnishes a good example of the value of what might be called unorthodox methods of meeting somewhat abnormal conditions.

Pipe-line power emphasizes rate incongruities

MUCH has been said in criticism and in justification of differences between local rate schedules and contracts for electric service. Ten or more years ago these differences in form and structure did little violence to the circumstances affecting consumption. But today electric service is a national institution and it encounters other nation-wide industries as current or prospective customers. In all these transactions incongruities in rates and contracts are thrown into sharp relief.

Petroleum companies, many of which operate in many different electrical areas, have discovered this to their discomfiture. Taking only the matter of power for pipe-line pumping, there is much—much too much—of residual individualism in the contracts and rates offered. R. E. Keller's analysis of twenty-eight such schedules for pipe-line pumping power, printed elsewhere in this issue, amounts to no less than an indictment of those who, in the face of experience, are perpetuating matter of opinion in rate schedules, despite data which should sooner have resulted in a higher degree of homogeneity.

No one conversant with the differentiating factors of cost and value of electric service under the varying conditions of locality and use would be so unreasonable as to expect prices to be uniform everywhere. No one would ever ask that contracts be identical everywhere. But it would not be an unreasonable person who should ask why there must be all the sports, hybrids and variants disclosed in this study for the petroleum industry. It is time for individualism in rate practice to give way to the regional and national unity which can be founded on a reconciliation of facts with practice.

Are transmission lines in natural-gas areas outmoded?

NOW comes what may ultimately prove a new era in power generation practices in several areas, scrapping old standards of engineering and costs. On the authority of the chief gas and electrical engineer of the California Railroad Commission it is stated that cost data for comparable service in power transmission by gas and by electricity shows a virtually three-to-one ratio in favor of gas over electricity on some actual installations in that state.

When, as in C. C. Brown's discussion as reported in last week's issue of the ELECTRICAL WORLD, the electric line costs $190 for the transmission of each million kilowatt-hours while the gas line costs but $65 for comparable service, one may, where natural gas is available and heavy load centers are to be served, bid farewell possibly to the construction of new electric transmission lines and foresee local power stations near load centers, generating with gas fuel and supplied by pipe lines.

Not alone for cost advantages would this be logical, for the industry's long battle with lightning as a frequent cause of outages would add a strong voice to any argument urging power transmission by pipe line. Reliability might be increased at the same time that otherwise necessary duplicate lines were cut. There would be many advantages and few drawbacks, assuming, of course, load centers of sufficient density to warrant local generation. Natural gas may be restricted as to locality and semi-permanent in character, yet it adds its influence to the general economic trend forcing the use of multiple power stations instead of superpower stations with long transmission lines. The eventual results will be dictated by reliability and economy.

Individual Manufacturer's Responsibilities

Production must be subordinate to market studies.

Sales volumes and customer acceptance conditions must be met by intelligently operated distribution and sales agencies.

Production and prices are means to an end.

By C. L. COLLENS
President National Electrical Manufacturers' Association

THIS business depression will pass. Co-operative effort, accumulated knowledge, thousands of discussions, hundreds of experimental trials and concerted action will result in an ultimate plan and an expedited recovery or else it will be terminated through the inevitable "muddle through" growth of this aggressive and vigorous nation.

In the meantime each business enterprise is forced to economize to the utmost in order to survive. Nevertheless it should plan to remedy imperfections in its policies and practices so that it will meet the recovery conditions to better advantage. The diagnosis of present ills should give curative knowledge and lead to preventive measures.

The electrical manufacturer has a business background that has been built largely upon production. His products were new and found a ready market and his problems were problems of production. Now and in the future, however, the attention of the manufacturer should be devoted largely to economical market developments. Sales and distribution take precedence over production.

Start with market studies

During this depression period the wise manufacturer will take stock of his business. He will study his markets, his method of distribution to the markets, his business policies and practices and readjust his production and distribution methods to the changed conditions. It may not be possible to apply remedial measures now, but it should be possible to formulate a plan and state a program that can be followed when business starts to recover.

Customer needs and desires afford a starting point for business analysis. Each market for each product should and can be measured quite definitely. In what markets are products being sold? What markets are good business prospects? It is well to know the rate of growth of each market, the buying volume of each market, the expected changes in each market's requirements and the product improvements that the markets would appreciate. Each electrical manufacturer can study his business to advantage by first establishing market data as to volume and location, next he should ascertain the proportion of each market he supplies and the definite lines along which he must work in order to increase his proportion or to extend his markets. Past market data and current market studies should be used as work sheets for future business programs.

Then study market development

The second step in a business analysis is to study distribution and sales from the point of view of meeting market conditions most economically and rapidly. Customers must be classified so that all distribution and sales tools are working to best advantage. It is well to take a new point of view on distribution. Starting with each market, its customer requirements and its present and prospective volume, it is well to study the distribution and sales mechanism best fitted to reach the market. This may result in direct factory-to-consumer sales, factory-jobber-dealer sales or a combination of the agencies in the different trade channels. Each product and its sale to each market should be studied as to the best mechanism and method of approach.

The use of personal selling, of agent selling, of factory sales staffs and the tie-in of direct mail and general advertising to sales objectives are features of an intelligently conceived program for market development. The immediate situation and that to be expected or desired in future years must be met by practical marketing programs.

An important part of this analysis is a study of distribution costs as applied to markets and products. Illuminating cost figures will come to light if analytical studies are made of sales, advertising and distribution costs by products and markets classified in terms of numbers of customers and customer buying volumes. These cost data are yardsticks by which to measure suggested changes in market development plans and establish the margins for setting up economical sales programs.

Production follows

After market studies and distribution studies are made whereby present and forecasted business volumes can be had by a proper distribution set-up, it is necessary to focus attention upon factory production. This should be based upon making quality products for use by each market by the use of modern factory methods and equipments that result in the lowest over-all costs of production. No manufacturer can retain fixed manufacturing

for Business Improvement

methods and equipments and meet changed market conditions successfully over a period. New tools, new processes, new materials, new products—all aspects of the business must receive close scrutiny and changes and readjustments must be made from time to time.

Purchases of materials, supplies and equipments must be based on a comparatively long-time forecast of production requirements and a uniform cost accounting system must be translated into intelligently conceived prices for use in the markets where the products are sold. Nor should it be forgotten that the very rapid decrease in labor and material prices in the last year resulted in a shrinkage of about 30 per cent in factory plant and equipment investment values, so that a cushion or economic obsolescence fund of ample proportions should be part of the cost base used in pricing. And standards of employment, salaries and wages must be established on a normal year basis and supported over fluctuating business periods in large measure.

Then come policies and practices

After a business enterprise has studied its markets, its distribution system, its sales mechanism and its production program it is necessary to fix certain policies and practices for its business conduct. Its policy as to price maintenance, as to financing, as to carrying customer credits, as to time payment and discounts and as to co-operation with other similar business enterprises lies within its own executive jurisdiction in actual application. But these policies and practices should be subject to detailed study in order to measure their effects upon both the individual business enterprise and the competitive or associated business enterprises that are serving the same markets. A bad or uneconomical practice can become a trade custom very readily and once applied is difficult to change. For these reasons the individual manufacturer must rely upon co-operative effort and industry-wide studies to fix his own policies and practices. Even in the restricted realms of market analysis, distribution agencies and production practices there is need and opportunity for the use of group efforts and group information. It is in this field that the trade association can operate effectively and economically.

But the individual manufacturer can and should institute the best practices and policies in the new philosophy of business conduct on a selective marketing basis before group action can be had. The yardsticks for industry education, guidance and control must come from the factual data and statistics of individual manufacturers and the strength and validity of these individual contributions will form the ground work for co-operative action in a trade association.

A time for action

It has been said that this business depression is salutary—a poison-centering carbuncle on the economic body. It also has been said that it proves past business and economic standards to have been visionary and impracticable. We have both the counsel of courage and the counsel of fear. But the best-informed opinion is that recovery can be expedited and future business conditions can be met to better advantage through incisive analyses, planned programs and revamped policies and practices. The only valid check on these suggestions lies in the application of these ideas by individual and group business enterprises. It is the part of wisdom to meet the challenge of the depression by instituting studies that may lead to new and better policies and practices.

This work starts with the individual manufacturer.

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Tentative Standard Tests for Lightning Arresters

In a tentative standard, recommended for trial in practice, the A.I.E.E. report on standards for lightning arresters (No. 28, March, 1931) makes proposals for surge tests and performance under cyclic test conditions. In the surge test the rate of voltage rise advocated in kilovolts per microsecond is 50 for arresters up to 6 kv., 100 for arresters between 6 kv. and 15 kv. and 100 kv. per 11.5 kv. of rating for arresters having a circuit voltage rating in excess of 15 kv. The rate of current rise is set at 75 amp. per miscrosecond to a crest of 750 amp. for line type arresters; for station type arresters these values are doubled. The rate of current decrease is also stipulated—the current is to fall to half the crest value in less than 10 microseconds.

In the performance test it is required that the arrester

be connected across a circuit of such power capacity and impedance that the generated voltage across the arrester shall not drop more than 10 per cent below the rated applied voltage for the duration of the follow-on current.

The standard operating duty test should be 30 standard operating cycles at intervals not greater than one minute. The performance is then judged by the physical condition and the volt-time and ampere-time results indicated by the typical surge test.

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Operating Circuits with Three Lines Grounded

By A. A. NIMS

Associate Professor of Electrical Engineering, College of Engineering, Newark, N. J.

The protection of power transmission lines from damage due to abnormally high voltages caused by lightning or other surges has mainly been in the direction of stronger, and more expensive, insulation. The object has always been to prevent the grounding of one or more wires of a three-phase circuit, since a grounded circuit immediately became inoperative because of excessive current.

Lightning can be robbed of much of its power to inflict damage by designing a transmission circuit that will operate with one or all of its lines grounded. Such slight destruction of material as may then take place at the point of grounding will be due to the lightning itself and not to the concentration of the power of the system at the point of fault.

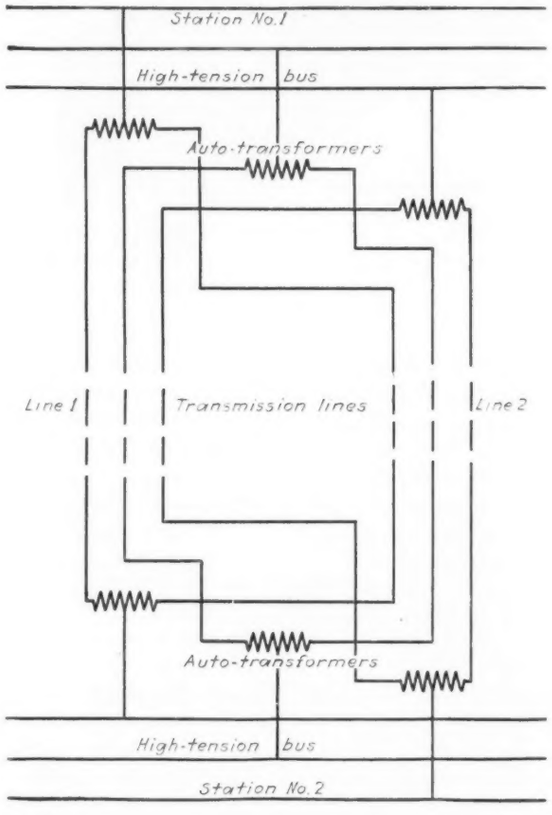
Important points in a power system are linked together today by transmission lines of more than one circuit. For the sake of continuity of service the different circuits often follow different routes, in order that a given lightning storm shall damage as few circuits as possible. By properly interconnecting any two of these lines lightning may strike and ground every conductor of either of the two lines without the flow of excessive current and without interfering with the delivery of power.

A two-circuit transmission line is shown in the accompanying illustration with two lines connected to the outer terminals of three auto-transformers at each end. The center terminals of the auto-transformers are connected to the busbars in each case.

With the load equally divided between the two lines the auto-transformers have only the voltage drop due to leakage impedance. If the line constants of the two circuits are somewhat different, there will be sufficient voltage unbalance to establish equal currents in the two circuits and the high impedance circuit will operate at a slightly higher voltage than the low impedance circuit.

If one line in one of the circuits should become grounded the complementary line would double its voltage to ground and there would be no change in current except that due to exciting current and a redistribution of charging current. If two lines of one circuit should be short circuited they would be at the same potential, the two corresponding auto-transformers at each end would be connected in series and the fault current would be only that due to the exciting currents of the transformers. The voltage between the corresponding two lines of the other circuit would be doubled and their voltage to ground would be $\sqrt{3}$ times the value previous to the fault. The line currents would be slightly affected by the exciting currents and the redistribution of charging currents, but the flow of power would be uninterrupted.

If all three lines of one circuit should become grounded, the three auto-transformers at each end would be connected in Y, with a common neutral point at the fault, and the fault current would be only that corresponding to the exciting current of all the transformers. The voltages of the other circuit, line to line and line to ground, would immediately be doubled, the currents would be slightly altered, by charging and exciting currents, but the flow of power would still be uninterrupted.



Self-protective transmission system in which no power is delivered to faults

Transmission lines are insulated to withstand several times their normal operating voltage, so that temporarily doubling the voltage is not serious. With no power current in the fault, it will not continue after the transient excess voltage disappears, so that a double transmission line of this kind should be self-clearing and operate almost indefinitely without trouble.

Experiments relating to the application of the auto-transformer for the suppression of power currents in line faults have been conducted and will be continued. Reports of these experiments will be made later.

Purchasing Principles

—An open competitive market.

—True price courage on the part of the manufacturer.

—Firm price policy with fair profit margin.

—Evaluation by buyer and willingness to pay a fair price.

By L. B. BONNETT
Purchasing Agent Brooklyn Edison Company

IN THESE days it sometimes seems to the buyer that there is no bottom to the prices at which suppliers will offer to take business. No buyer who has any vision of the complex interdependability of business and sees beyond the immediate transaction at hand wishes to make any purchase at a ruinous price. He knows that his company has also a product to sell which must be sold at a profit or eventually he will have nothing to buy. He believes that a supplier is entitled to a reasonable profit for services rendered and sales made below cost are uneconomic and unsound for the general business health, upon which his business is also dependent.

But how can he tell what are ruinous prices? In competitive purchasing, prices are sometimes offered for similar material with a wide spread between the minimum and maximum. Mr. A with a high price frequently says that he has made a special effort to give an extra good price, "that it is practically cost," etc. On the other hand, Mr. B, with a much lower price, will assure the buyer that his material meets all the requirements, that the price is satisfactory to him and represents a reasonable profit. Is Mr. B's price necessarily ruinous or unfair because it is well below Mr. A's apparent cost? No purchasing officer can keep himself up to date with the latest method of manufacture of all kinds of materials, nor is he able to judge within wide limits of what is real cost to produce. If any one knows what costs are, those making a specialty of some particular business should be the best informed. Overhead costs are not a rigid and unchanging percentage on all business. At a certain time manufacturing conditions may be such that a piece of business may be almost essential to the operation of one plant, while it would be merely an incident in another. Under such circumstances a much lower price may be entirely satisfactory to a manufacturer if it insures his securing the order and may represent to him an economic good, while that same price may seem ruinous to his competitor. Under such circumstances the buyer must assure himself that the articles offered meet his requirements, that the supplier is capable and responsible and is satisfied that he has made no mistake in the price. When so assured it would be utter folly for the buyer to disregard the low price offered and unfair not only to his own company but also to the supplier who has made the attractive price.

Comparative value determination

But in arriving at a decision as to which is the best purchase, it is necessary that the comparative value to the purchasing company, independent of the price, carefully be considered. Such a consideration of comparative value frequently may consist of two parts:

1. Tangible definite figures of capitalized value due to differences of efficiency or of operating costs or of cost of installation, etc.

2. A carefully considered judgment of money value for less tangible items, such as probable maintenance cost, prompt availability in the district of spare parts, space occupied, the reliability of the supplier, etc.

It is not easy in these latter less tangible items to be sure that one's judgment is not biased by the personal equation of the salesman, or a prejudice due to previous experience, favorable or unfavorable, or a hesitancy to try something new. It is helpful if these judgments of relative value as distinguished from relative cost can be determined from the engineering facts submitted before the prices are known. Such a process is conducive to a carefully considered decision.

When such a definite dollar evaluation of relative value has been reached the buyer should have sufficient confidence in the justice of such figures to be willing to pay the supplier, whose article has greater value, a price which is higher within the limits of its superiority of value than the price of the less valuable article of the competitor without trying to beat down that higher price to a lower level.

In these days of stress the firm price policies painfully built up may easily be destroyed and be replaced

by the dickering process, to the ultimate hurt not only of the seller but equally of the buyer. If the supplier has, as he should, made originally a proper and reasonable price, he should have the courage of his convictions and stick to his price. And the buyer, realizing that in these days a substantial order is a powerful weapon, must not forget that power also brings responsibility and that weapon must be used with a careful sense of fairness. As a result the order does not necessarily go to the man whose only argument is a cut-throat price but rather to the man who, with a reasonable and proper price, has demonstrated and proved the advantages of his article.

Under such a general plan, the true economic price of an article can be determined to the buyer's satisfaction through competitive bids in an open competitive market, which I believe results in the fairest opportunity to all to secure a proper price. Collusion as to prices on the part of suppliers immediately breaks down in the buyer's mind that spirit of mutual confidence that forms the best basis of business transactions. Since he feels he is being unfairly dealt with and can no longer depend upon the figures to determine the true economic price, he welcomes any opportunity offered by any supplier to break through the wall of such collusion as evidence that unfair prices are being made. Under such circumstances he can hardly be blamed if his use of the weapon of buying power seems ruthless. History indicates that price-fixing schemes never continue long, and one reason may be the spirit of distrust which they immediately generate.

An open competitive market, true price courage on the part of the manufacturer, the naming of a firm price which is fair in consideration of competitive and economic conditions of the time, through selling of the real advantages of an article, conscientious evaluation on the part of the buyer, and a willingness to pay the price offered when the evaluation shows it to be competitively sound, seem to be fundamentals on which healthy business relations between buyer and seller can be built.

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Electricity from River Once Worked for Gold

When the World War broke out, in 1914, Curityba was already recognized as a leading industrial center of southern Brazil, but difficulties in obtaining manufactured goods from Europe during the war gave a greater impetus to, and encouraged the setting up of, new factories in the city.

Curityba possessed some of the necessary factors that determine industrial development. There was a superabundance of raw materials, a splendid climate and a good supply of intelligent labor. But one vital factor was lacking. Curityba did not have at her command dependable power for the proper conversion of her wealth of raw materials into usable form. The whole population of the state extended a hearty welcome to a new company which took over Curityba's light and power and street railway services in 1928 and immediately initiated a program of widespread improvements. The present owner of these services is the Parana Power & Light Company (Companhia Forca e Luz do Parana) which is associated with the Emprezas Electricas Brasileiras, S. A., through which association the Parana company has at its disposal the financial assistance and technical aid of the Electric Bond & Share Company in New York.

Penstock on 1,000-ft. head anchored to Brazilian mountain

A site for the plant was chosen on the São João River because of its favorable location from the standpoint of rainfall and river flow and its relative proximity to Curityba. The site was selected in December, 1928, and actual construction of the plant was started in March, 1929. The plant began operating in March, 1931.

The new plant is called the Chamine hydro-electric generating station, receiving its name from the Chamine water falls, near which the plant now stands, approximately 35 miles east and south from Curityba.

A reinforced concrete dam, from which the river water is diverted into a pipe line leading to the power house, is at an altitude more than 1,000 ft. above the power house. The dam stands at the upper end of a horseshoe bend in the river, approximately 3 miles long.

A tunnel 6 ft. in diameter and penetrating a rock and soil mountain for a distance of 7,200 ft. was driven. A steel pipe line leads from the dam into the tunnel at the upper end and the lower end of the tunnel is connected by a steel penstock to the power house. The water, at a pressure of 435 lb. per square inch, turns two Pelton waterwheels, each direct connected to a generator, each of which produces 5,500 hp., or 5,000 kva., of electric energy. The generators were manufactured by the General Electric Company and both waterwheels and generators, as well as all other equipment of the station, are of the most modern type and design. Electricity is generated at 6,900 volts.

Banker Outlines Program to Stabilize Business*

By ROME C. STEPHENSON
President American Bankers' Association

"It still remains true, despite the economies of mass production, that supply must be co-ordinated to demand, that production must be gaged by potential consumption. Sound business originates in the desire and ability of the people to buy and consume, not in the desire and ability of the producers to produce and sell."

LOOKING back over the past decade it must appear to us from the clearer perspective of the present that it was in many respects a period of false business philosophy. In a study of that philosophy we can discover the primary causes of the conditions—we can agree that in the past decade the clamor of jazz and the whirl of the dance which we thought was a permanently higher standard of living confused our vision of some of the major realities.

Was it not a period of overstimulation in almost every direction?

In the field of finance our credit machinery was used to place in the hands of our people a greater pool of purchasing power than the people of this or any other nation ever possessed.

I refer to the speculative security markets, where a belief was generated that our industries had before them an unbroken and unlimited period of prosperity and was used as the basis of a fabulous inflation of stock prices. These, in turn, were used as the basis for a fabulous expansion of stock market credit, mainly by means of bootleg loans in the call money market. Easy profits and high interest rates also attracted billions of dollars of foreign money to finance speculation on credit. This great volume of immediate and irresponsible purchasing power stimulated spending throughout our economic structure.

I refer also to the fact that outside the security markets a tremendous expansion of immediate consumer purchasing power was brought about by uncorrelated installment selling, by which it was possible for our people, through multiplying installment credits for purchases in various directions, to anticipate the earning powers of perhaps several years.

Credit was not the only means by which a tremendous volume of immediate purchasing power was placed in the hands of our people. High wages and steady employment were made possible by economies of mechanized mass production and a great volume of current business. Furthermore, supposed prospective business appeared to promise that these conditions would keep up forever. The result was that our wage-earning masses had an unprecedented amount of cash to spend—and they did spend, in the carefree atmosphere of the times.

Necessary to keeping this situation going were great campaigns of production and distribution of consumers' goods. These were essential to keep plants busy and to meet payrolls. Advertising and salesmanship outdid themselves in their assaults on the great pool of public buying power created by high wages and inflated credit. Our great business chiefs set up tremendous production programs and the sales forces were lashed to superhuman efforts to keep distribution up with production. "Produce and sell! Produce and sell!" was the throbbing tempo of industry, beating like the relentless tomtoms of war. The advertising medicine men took up the beat and with their spells and incantations they got the public swinging in a mad dance of unrestrained spending. It was the new American standard of living.

The spending was largely for consumers' goods bought on credit, to be liquidated out of the labor of future years. May we not ask whether this great stimulation of production, selling and spending that brought to millions of our people the immediate enjoyment of comforts and luxuries that they had not yet earned, and such as never so great a mass of people in any nation had ever enjoyed—may we not ask whether this was the high standard of living that we thought it was? Was it a style of living that we could keep up indefinitely? Was it permanent? Rather, was it not an over-reaching standard of living, borrowed from the future, crowded into and consumed in a few years that will take several years to earn and pay for? If that is so, the high standard of living of the past half decade will have to be paid for out of a lower standard of living for the next few years.

More sober business leadership

Are we not justified in saying that more sober business leadership, more sincerity of financial guidance, more good economic advice than much of that which was noisiest in the past decade are essential, if our people are to be conducted along the paths of sound progress

**From address before recent annual meeting U. S. Chamber of Commerce.*

that will bring them the lasting national prosperity to which their energy, the abundance of their natural resources, and the basic beneficence of our political institutions entitle them?

The general outlines for a plan of economic stability are clearly definable.

For industry they call for thorough efficiency in plant management and economies of productive processes so that the nation shall perform its industrial tasks with the minimum of waste materials and human effort.

Lengthen the business cycle

Equally important, if not more so, is the necessity that industry look upon business on a long-range basis. It should lay out its production and distribution plans with the thought that it is far better to have a long period of good sound business activity than a short period of frantically overcompetitive endeavor. It would substitute the headlong make-hay-while-the-sun-shines-attitude—the rush to get the public's money before the other fellow gets its—with the more sober attitude that it is the foremost function of industry to render a steady progressive service in producing for and distributing to the public those things it needs and can absorb. This should tend to lessen overproduction, to prevent overexpansion of plant capacity, to avoid overstimulation of public buying, followed by reactions of stagnation.

For business, too, there is a function in this plan of economic reconstruction. It is to render close co-operation with industry in its endeavor to avoid reckless overproduction, overstocking, overselling the public or inveigling the public into committing itself for expenditures beyond its current purchasing power, plus a reasonable anticipation of future earnings and purchasing power. Especially should it refrain from inveigling the public into habits of but half using the things it buys and hastily scrapping good values to seize catchy, newfangled models. Such a policy of merchandising may stimulate for a time a feverish turnover of business, but in the long run it defeats its own purpose by exhausting the public's purchasing power, by exhausting, too, the psychological reaction of people to sound progress and true improvements.

In this picture of economic reconstruction, banking and finance, too, have their place. Their premeditated effort should be to influence the use of credit and other financial facilities into channels of sound public economy consistent with the attitude I have already sketched for industry and trade. Finally, the individual has a place in this plan of a sounder economic future for the United States. It is the duty of industry to give him steady employment as a producer. It is the duty of industry and trade not to exploit him as a consumer. But there their obligations to him cease.

It is the duty of the individual, given the freedom of opportunity that our political institutions and our economic organization normally offer, to take care of himself. Taking care of himself consists of seeking that form of livelihood which will render him the highest return in accordance with his abilities. It consists of gaging his personal financial plan in keeping with his earning power. And this means that after providing for the living requirements of himself and family, he must on his own initiative and on his own personal responsibility set up his defenses against the inevitable contingencies of life.

It is here that our traditional American individualism must assert itself. The individual determination to provide against sickness, accident, death by insurance must be asserted before indulgences in extra comforts and luxuries are given place in the family budget.

Equally imperative is it that, at this point in personal finance, individual responsibility take measures to guard against the contingency of unemployment by means of a sound program of thrift and savings. There is the solution of the hazard of impaired or lost current earnings and purchasing power—adoption of and devotion to a sound program of thrift and savings out of the earnings of good times, rather than dependence on doles from employers in bad times.

It is the practice of corporate finance to set up reserves against depreciation and contingencies, and surplus against lean years and unforeseen conditions. It should be the practice of the individual to set up insurance as reserves against depreciation and final charging off of the human plant, and savings against the contingencies of impaired earnings and unemployment of the always hazardous future.

I know of no greater national misfortune that can come to the United States than a weakening of this sense of individual responsibility and eagerness for economic independence—and such a weakening is bound to come as a result of agitation to shift the burden for favored political classes to some form or other of public doles, or for our laboring masses to some form or other of corporate dependency.

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Industry Stabilization Proposed

THIS issue of ELECTRICAL WORLD contains articles by leading business men within and without the electrical industry. They discuss the business problems of the electrical branches in constructive terms and parallel the discussions held by the U. S. Chamber of Commerce. A thoughtful study of these articles by electrical men is warranted because they contribute to the national program for securing better business conditions and an improved business mechanism. Messrs. Collens, Berresford, Bonnett and Stephenson point the way for the industry to follow.

Co-operation in Business

—New conceptions of the trade association.

—Current conditions in electrical manufacturing.

—A factual approach to business co-operation.

—Readjustments to extend corporation activities.

By A. W. BERRESFORD

Managing Director
National Electrical Manufacturers' Association

ONE effect of the present business condition must be to move the trade association nearer its true position of being the agency through which its industry group reaches understanding of the policies and practices essential to its existence and progress. It will cease to be looked upon merely as a means for protecting the existing interests of its members against the invasions of others.

The current depression is forcing upon each unit of each business group the realization that it cannot, by and of itself, determine its own operating policies and practices. These must be determined, not merely in the light of the conditions affecting the members of the specific business group, but with knowledge of those affecting other business groups. Only through such consideration can there be evolved the policies which make for continuing profitable operation and orderly progress.

Inherently there are no limits to the operations of a business enterprise whether manufacturer, wholesaler or retailer. There is nothing to prevent an efficient management from extending its field of effort where it will and such extension of field is inevitable when profit beckons. Only the trade association can provide the forum in which, by collected information and analytic consideration, can be determined the readjustment necessary to changed conditions. Trial and error—the basis of individual operations—is too expensive a method to adopt, both in time and money, and equally to all elements, whether to those whose expansion may have caused disturbance or those affected by it.

A brief review of business as a whole is necessary to a proper perspective of the present conditions in the electrical industry. This study will show that business has not developed consciously or as a unit in the social and economic environment in which it operates. It is a composite of tradition and legal conceptions applied to it by the body politic and it has had neither the time nor the necessary unity to fix its own conception of itself, to determine national business policy, or to formulate its own policies and practices as a contribution to the national economic and social structure. Business grew without a plan or a program, and yet a plan and a program for business is the greatest national problem of the country.

Business has centered in the corporation

Business has grown as a multitude of independent business enterprises and the evolution has been, through mergers and purchases, toward the corporation as the efficient agency for conducting a business enterprise. Centralization of ownership and directive power in business lies in the corporation. And there is no rule requiring a corporation to remain within its original field; it may extend as it will. This can be done directly or through intracorporate ownerships. This trend has occurred in all business and is not peculiar to any branch.

A manufacturing corporation, for example, may first extend its activities in the direction of ownership and control of raw materials and so invade established business in these fields. A second move may be through ownership and control of distribution channels, such as wholesalers and retailers. A third move may be an invasion of banking through use of surplus funds in the call market or investment market, or by carrying customer credit under conditions and upon time durations

heretofore considered the activity of the banker. With these expansions come disturbance and disjointing of the so-called legitimate (but really only traditional) trade channels—manufacturer, wholesaler and retailer.

When the business field so invaded is inert, unorganized and simple in structure, little effective opposition or articulate objection is encountered. Raw material control is typical of this type of business extension. But the invasion of distribution and sales channels, through amplification of intracompany ownerships or affiliations with existing agencies in these channels, creates an industry disturbance, encounters organized opposition, introduces a more complex business structure and necessitates an industry-wide readjustment in organization, policies and practices. That this situation pertains in the electrical field should occasion neither surprise nor resentment. Evolution is responsible and there is no reason for assuming that any one field will be unique through its absence.

Business units in invaded channels generally oppose the invasion by two means: First, through price reductions, and, second, through the establishment of a trade association to protect what they consider their vested interests by the use of all available political, legal and economic weapons. Quite largely the birth of the trade association in each business channel has been so influenced.

No limit to efficient management

From the point of view of social and economic welfare, no one wishes to place artificial restrictions or limitations upon business or business management. It could not be done effectively if one attempted it. No one would define or limit the activity of an efficient business management. All believe that the spur of sane competition affords a healthy stimulus for national progress, and all will agree that each function and agency in business should exist only because it is economically justified—not merely because it has existed.

Granted these principles, however, the fact remains that broadening the activities of one business channel to include others creates industry disturbances. The ultimate result may be general improvement, but the transition period, unless motivated by intelligence and self-restraint, may well produce sufficient disruption to nullify the effects of that improvement over an extended period No agency other than the business group concerned is competent to direct the transition period, and the trade association is the logical agent of the business group for the doing of the work. Properly employed, the trade association would find in this function its major field of service at this time. It should be the source of power and the source of information for making the necessary business readjustments.

What are the economical trade channels?

For example, in the past the bulk of electrical products have found their way to consumers through a distribution chain made up of manufacturer, jobber and dealer. This trade channel developed because it was found to be efficient and economical. Its activities could be co-ordinated and made to supplement each other in a rapid and efficient market development program. Each unit group in this chain represented different functional activities, had independent ownership and operated on a co-operative basis with something of protection from a "vested interest" type of trade association.

Trade channels must be justified

Now each business unit in this chain must stand the test of competition with more direct business activities. The manufacturing corporation is reaching directly to consumers or is buying or establishing its own links in the chain. Consumer groups are inclined to go directly to the corporate manufacturer. These trends must be measured in terms of national welfare, and business itself must evaluate them and readjust its own operations to meet the most economical functional allocation of its activities. Market studies, distribution cost studies and the application of selective marketing principles are necessary tools to use if functional allocations are to be accurate or if readjustments are to be made without disastrous economic wars and wastes. Here is a major problem for the trade associations of the different groups in the electrical industry. They must work together as well as individually to reach an accurate conclusion that embodies the definite formulation of the required policies and practices.

Again the electrical groups, in common with others, have extended their business activities into the field of banking, in that they carry customer credit for relatively long periods as part of their sales procedure. They do this because this requires less obligation on the part of customers in the form of securities, because this expedites market development, because money is obtained at a lower rate by using both primary and secondary credits, and because it has become a trade custom. This practice, as does that of putting surplus funds in the call market, meets the criticism of bankers as a group and of groups within the industry who do not believe it to be desirable. It surely calls at least for thorough study of conditions as to particular products and customer groups to define policies and practices that merit approbation and to fix the economic limitations. What better agency can be found than the trade association for doing this work?

Flexibility must be controlled

One of the reasons for the success of the electrical manufacturer is his flexibility in business activity. He does not specialize in function or products, but adds to his lines wherever and whenever he visualizes opportunity. Some of these additions may be made in the belief that, while not essentially profitable in the current market, they indirectly but actually add to total profit. The rounding out of an otherwise incomplete line by the addition of elements sold temporarily, or even permanently, at a loss may, it is felt, develop distribution possibilities which will result in an over-all net gain. These steps will be taken despite academic discussion of the legitimacy or the ethics of sale below cost. They may, in fact, be warranted and justifiable. The essential is that they be done intelligently, with knowledge and in full assurance that they are warranted. The mutual long-time interest of manufacturer and customer is the only yardstick that can be used to measure these situations. How, save through the operations and inter-operations of trade associations, can this yardstick be developed?

The usual result of zeal for sales in a highly competitive market is price reduction or price discrimination,

directly or indirectly. How far can this go before the interests of both buyer and seller suffer? There is a point where the desire to sell goods leads to no profits and an unhealthy economic condition, but who shall fix the danger light? Can the situation be controlled and should business itself control it, or should, as has been suggested, some governmental agency?

Solution to the price situation

At present there are but two solutions for an uneconomic price situation, viz., price fixing or the exercise of intelligence and self-control by the individuals involved in the situation. The first remedy is illegal and largely impracticable, but the second can be applied. The trade association is the best agency for increasing the intelligence of individual managements by providing statistical and business information and by teaching the principles of good business practice. Any ethical price policy must be based upon relative stability of prices, built upon a background of business knowledge, whereby both overproduction and overbuying are eliminated as inducement factors for price cutting and price discrimination.

Profit is the single objective of business. The business chain is profits—sales and prices—costs. Many business men have yet to learn this, however, and the knowledge is not universal that volume of sales and net profits are not necessarily correlative. And the basing of selling price strictly on costs is not necessarily the only method for securing profits. "Cost-price" relations need not be regarded as immutable. Costs are only the final output values of the division of the business which supplies the products, the balance of the price structure being functions of the psychological values at the sales end of the transaction—components of which are the value appraisal of the consumer and the ability of all of the vendors to supply the consumer demand. This is a new and not readily accepted economic philosophy to many manufacturers.

Prices fixed at sales point

Frequentiy the fixing of price is the last step in the transaction. The production cost is determined, administration and sales expense allocated by formula, profit added, and the total used.

In many cases adequate market study will determine the price at which can be obtained the distribution resulting in maximum profit. Starting with this price as the basis may well result in constructive thought that will so modify sales and production methods, and even the device itself, as to make the desired price possible. Under these conditions price making becomes a major factor in an aggressive market development program, rather than a routine evolved to meet a general condition and subject to subsequent correction by the method of trial and error, and at possibly substantial loss.

When trade associations take their true relation to their respective groups they will be in position to furnish at least the basic data for such market study and to advise as to its conduct. Moreover, by co-operation with other branches of the industry, data would be available to aid in determining the desirable outlets and the price margins essential to development on the most expeditious and economical basis. They will, however, assume this relation when, and only when, their memberships appreciate its importance and demand it.

Control of production is an important aspect of the price problem in electrical manufacturing as in other business, and in the current depression the economic penalties for bad practices in production have proved to be more severe than could the legal. Control of production is necessary to the stability and prosperity of any industry and can be accomplished through the control of inventories and sales promotion activities by individual manufacturers. The key is knowledge of demand and supply, intelligence and self-restraint in the determination of policy and courage in adhering to that policy when fixed. Again the trade association is the only tool at hand for the collection and dissemination of these facts.

No statements made herein contain any element of discovery or inspiration. In one form or another they have been made again and again. Their truth is accepted but not realized, and until there is realization there will be no effective action.

Sentiment and pocketbook appeals

It is an axiom in politics that public attention can be attracted only by two types of appeal, viz., to sentiment and to the pocketbook. These statements are a direct pocketbook appeal to every member of the electrical manufacturing public. They are not so recognized because the average manufacturer does not realize that a broad industry condition or movement directly affects him. He gives far more weight to the happenings which come within the narrow field of his own vision and whose effect he can immediately apply without mental effort and by reason of his specialized experience. He discounts that which may be infinitely more important because, without study and personal effort, he perceives that importance only vaguely, if at all. He bases his business policy and practice, not upon study and factual data, but upon contact and instinct. This is easier and entirely human. It requires an extraordinary situation to arouse him to anything broader.

Is not this extraordinary situation present? The industry is faced with new and serious conditions in each branch (and between each branch) which, with even normal business conditions, would demand all that there is to give of intelligence and foresight. But, instead of normal conditions, there is superimposed on the already difficult situation a world-wide industrial depression.

The obvious remedy is knowledge of fact. Fact as to what has been, and is, and intelligent estimate of fact that is to be. Fact as to stocks, shipments and market absorptive capacity to guide production. Fact as to orders received and orders in hand to forecast production and absorption rates. Fact as to dollars and items to indicate price trends. Fact as to destinations to indicate distribution trends.

Fact to be gathered by the obvious agencies—the trade associations—and to be disseminated for interpretation by the individual manufacturer in the light of his education. And in the gaining of that education the association relation can be the major factor.

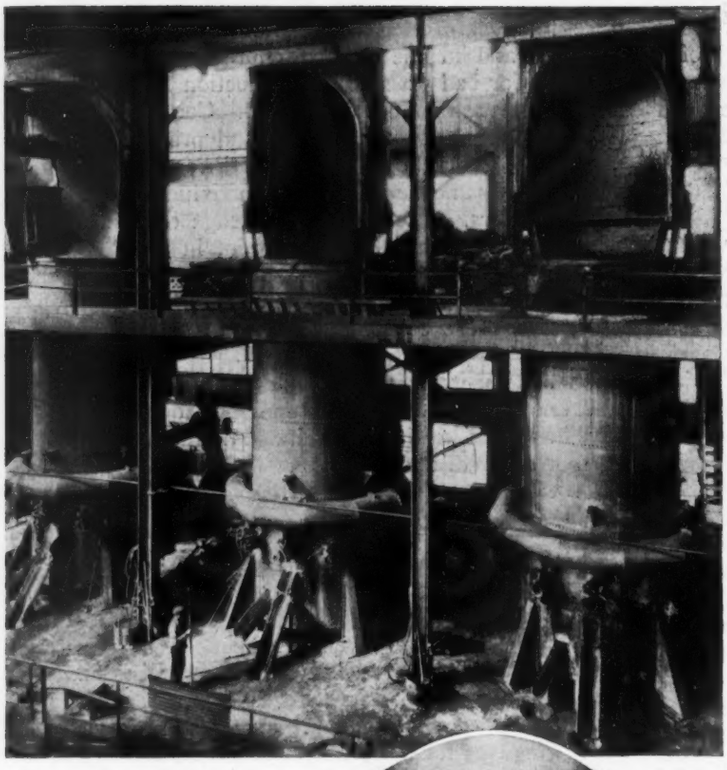
It means a vast amount of labor, a task from which one instinctively shrinks and whose adequate performance one instinctively doubts. But co-operatively it can be done, and efficiently planned and with the proper tools it can be done effectively. Ultimately it will be done. It should be begun now—no expenditure will pay greater return.

WHERE EVERY C
Is Performed and C

By E. L. WINDENBURG
Sales Engineer Cutler-Hammer, Inc.

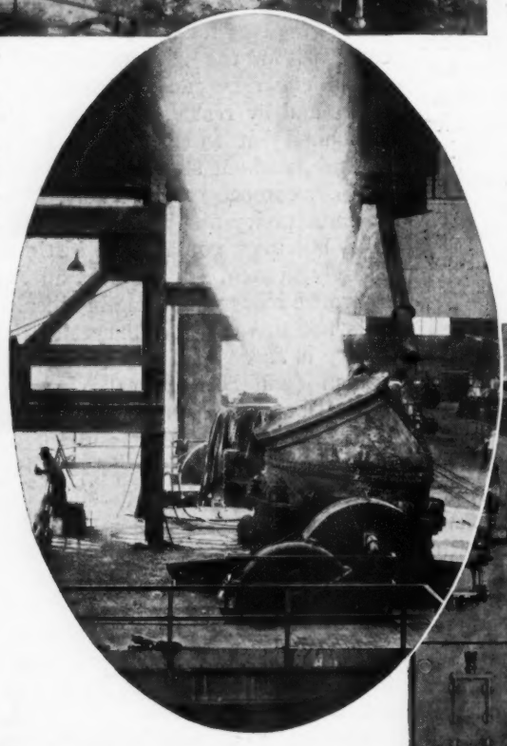
SPEED of production, operating economy and elevation of labor from fatiguing muscular effort to direction of machines are secured by the extensive application of automatic motor control to the making of wrought iron in the new Ambridge, (Pa.), plant of the A. M. Byers Company. From the charging of raw materials in the cupolas to the working of the iron into finished products motor-driven machines handle the metal throughout its processes, starting, stopping, swinging, turning, tilting, pushing, performing manifold functions at the simple behests of buttons and controller handles.

The central element in the Byers process for making wrought iron is the "sponge ball." The sponge ball is produced by pouring practically pure bessemer-converter refined iron into a processing cup that contains a charge



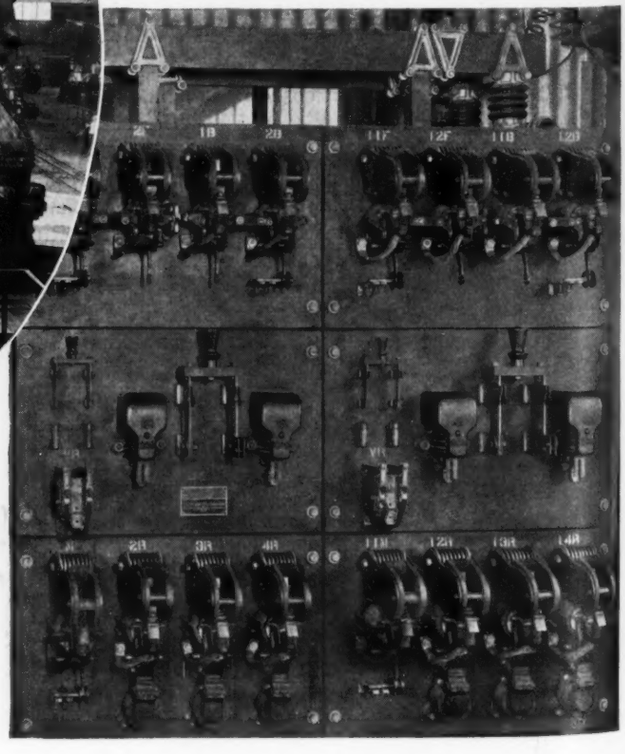
The starting point

The process starts at these three cupolas, in which the pig iron, coke and limestone are melted. Each material is hoisted by a special crane with a boom attachment shown at the upper left entering the cupola.



Purification by converters

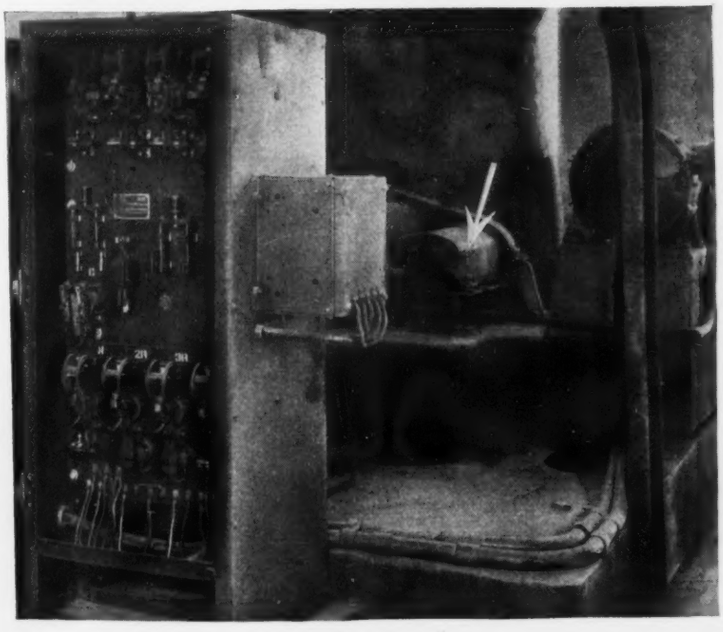
The molten metal from the cupolas flows into a hot metal car which is pulled along a track by means of an electrically driven winding drum and cable. When the car is in the front of the converter current is obtained for the motor driving the car-tilting mechanism by plugging into a convenient receptacle. The content of the car is dumped into the tilted converter, which is manipulated by two 85-hp. motors by inductive time-limit controllers. Individual controllers are used for each motor, being operated from one drum type master. After the cupola iron is fully refined the converter is tilted and the blown metal flows into another hot metal car on the ground level. This car is also hauled by an electrically driven winding drum.



OPERATION Controlled Electrically

of colder molten slag. The excess slag is poured off, leaving in the cup a spongy mass of iron, from which the surplus slag is squeezed by an ingot press.* This process, so sketchily described here, requires in its performance iron melting and purifying, slag melting and the mixing of the two, and includes many operations in the handling and working of the materials. The accompanying pictures illustrate the process and show some of the many applications of automatic motor control in it.

*See "Electrical World," January 24, 1931, page 180.

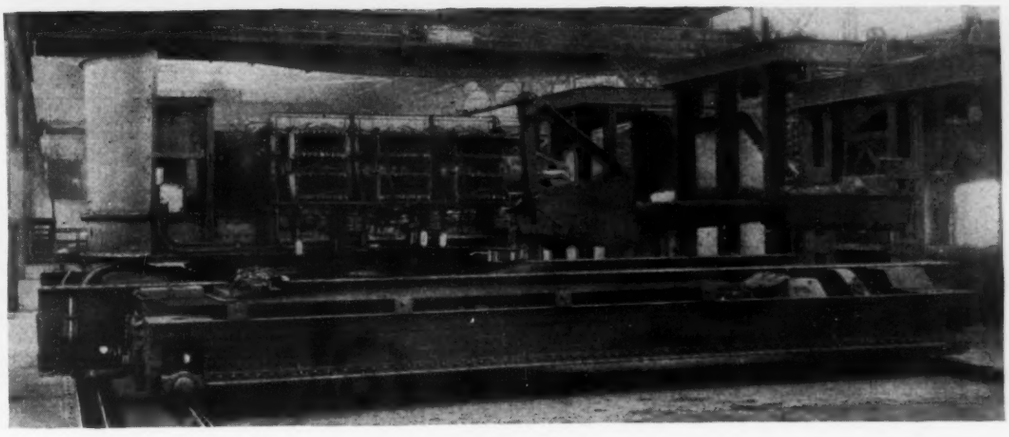


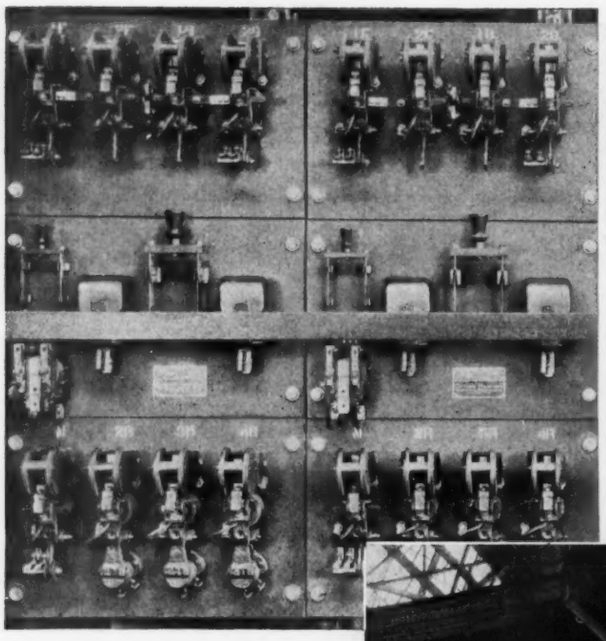
Oscillating ladles

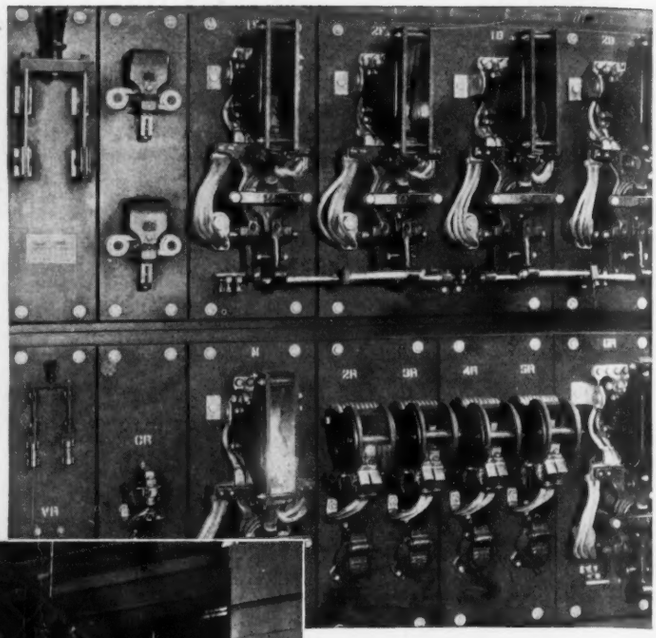
The ladle on the hot metal car is hoisted by an electric crane and the refined iron is poured into the processing ladles. These ladles are located on a platform and beneath them on an oval track are the processing cups containing molten slag. At the rear of the processing ladles can be seen the automatic controllers for the traverse and oscillating motions of the ladle. The tilting motion is obtained by adjustable speed drum controllers. Two inductive time-limit controllers automatically cause each carriage and its ladle to oscillate back and forth and also to travel forward and backward. This insures even distribution of the metal in the processing cup below. An arrow points to the traveling nut limit switch which gives the automatic back and forth movements.

Preparing the slag

The molten slag for the processing cup is made in a tilting open-hearth furnace. In front of the furnace moves an electric floor type charging machine with a box filled with slag-making material ready to be charged through an open door of the furnace. These doors are electrically operated by push-button controllers. The resistor banks and reactance coils for the inductive time-limit controllers for the charging machine can be seen at the left. The operator can move the complete machine up and down the track or can make the carriage travel back and forth on its own body. He can rotate and also raise and lower the peel or arm which handles the charging box for dumping its contents. The upper portion of the machine can be rotated in a complete circle. This gives the operator extreme flexibility of control. The fact that inductive time-limit control always gives the same acceleration enables the operator to time his motions and facilitates the highest operating efficiency.







Pouring slag into

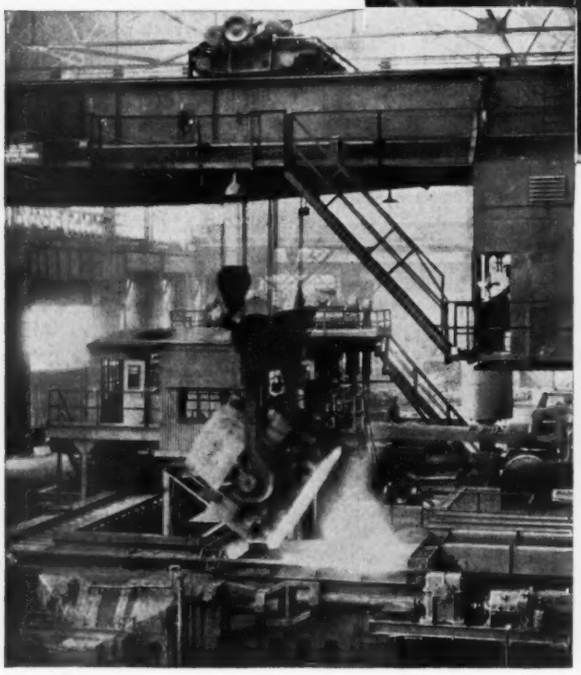
The slag-making furnace is being tilted to discharge the molten slag into the processing cup. The operator, who is stationed on the platform at the left, operates the inductive time-limit controllers mounted at the left above. A crane delivers the processing cup with its load of molten slag to the processing circle car, which is driven by a 180-hp. electric locomotive. This hauls the processing cup under the processing ladles. Control for the 180-hp. locomotive

processing cup

is shown at the right above. It is of the inductive time-limit type and the magnetic main switch is just opening. Underground rails carry the power to the motor. The operator is stationed on the processing platform, where he can observe the processing circle.

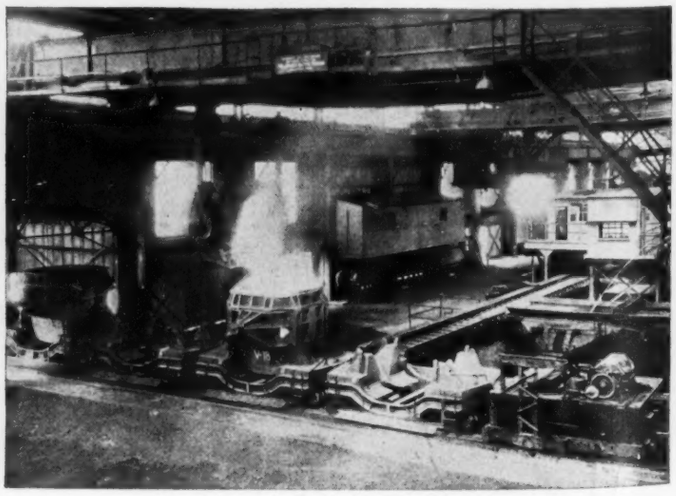
Into the ingot press

The sponge ball is transferred to a 900-ton electric press where the excess slag is squeezed out and the ball is compressed into a bloom approximately 18 by 24 inches by 6 feet long.



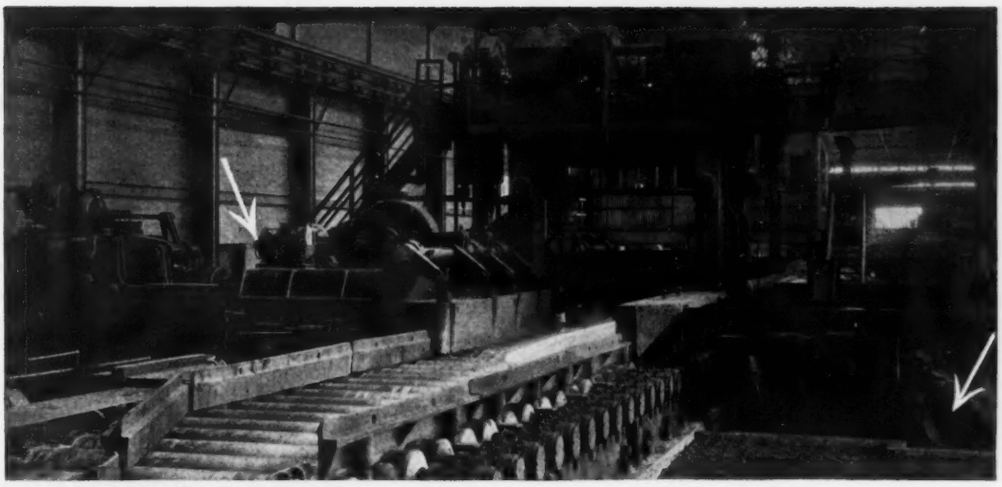
Sponge ball is freed of excess slag

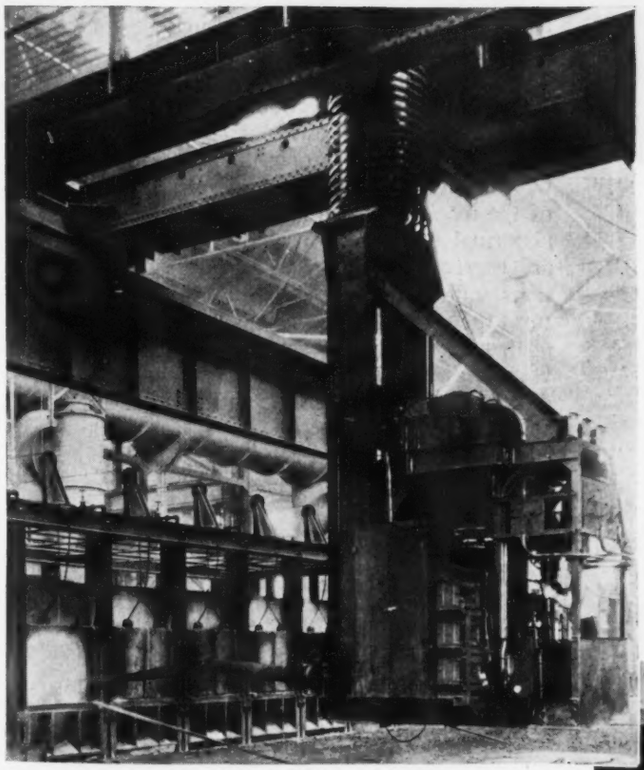
After all the refined iron is poured from the processing ladle into the slag in the processing cup the electric locomotive transfers the cup to the pressing department, where the cup of sponge and slag is hoisted by a crane and the surplus slag is poured off. In the bottom of the cup there remains a huge sponge ball (about 6,000 to 8,000 lb.). The crane is equipped with inductive time-limit control. Definite response to the operating master must be assured in order to pour off the surplus slag only and still leave the sponge ball in the cup. Dynamic lowering controllers are used on the hoist and limit the speed to a safe value and give graduated dynamic braking for stopping.



The bloom becomes a billet

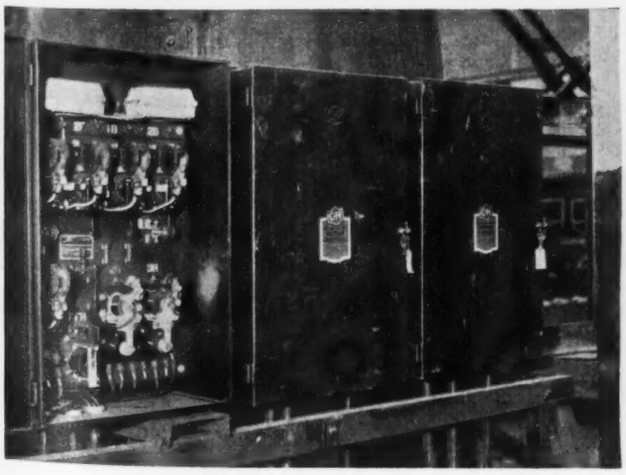
The bloom is transferred by an approach table from the ingot press to the 40-in. blooming mill, where it is reduced to a billet. The electrically driven screw-down, side guards and manipulator fingers can be seen. Electrically operated magnetic shoe brakes are referred to by arrows.

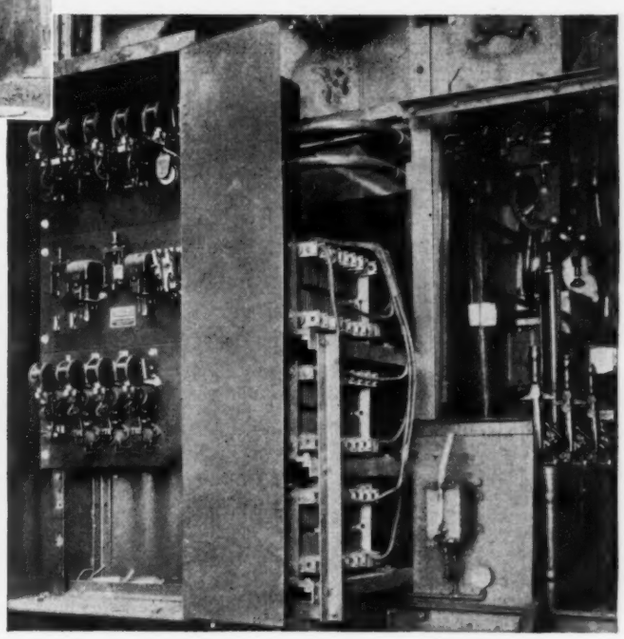




Reheating for manufacture

After leaving the mill the blooms are cut to required length by an up-cut bloom shear, after which they are weighed and go to the storage yard, and thence, when required, to the reheating furnaces by means of the reheating furnace-crane charging machines. These machines can be rotated, have bridge and trolley motions and the peel can be raised or lowered. Part of the control and masters is shown below in the right hand insert. Reheating furnace doors are opened automatically by push-button controllers. The individual motors carry an arm or crank which actuates a cable running over the top of the furnace to the door. The controllers are shown at the left below. From the reheating furnaces the billets go to the 46-in. universal mill, skelp mill or merchant mill.





Compact Substation Travels to Meet Mine Loads

By R. C. TURNER, JR.
Switchgear Department,
General Electric Company, Philadelphia, Pa.

A mining substation on wheels which may be moved through spaces accommodating the usual mine car has recently been adopted by the Tennessee Coal, Iron & Railroad Company. When the load center moves to the maximum economic distance from the station the traveling station is hauled to the new working face and placed in service. No special foundation is required. Two trucks, equipped with standard mine car wheels and requiring only standard mine railway tracks, are used.

This substation consists of a 150-kw., full-voltage-starting induction motor-generator set for converting 2,200-volt, three-phase power to 275-volt direct current, together with full automatic control equipment. Labor-saving devices facilitate the task of connecting and disconnecting the equipment. Self-oiling wheels of 10 in. diameter, together with rugged axles, permit frequent and rapid moving. The complete substation can be disconnected, moved to a new location, reconnected and placed in service within six hours.

The motor of the motor-generator set was designed for full-voltage starting since this method of starting requires a relatively low initial investment and offers a simplicity of connections, together with compactness of the automatic switching equipment

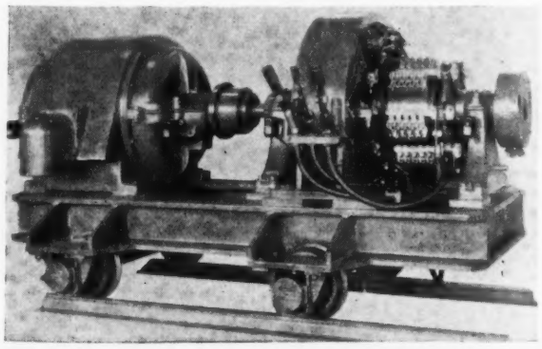
One of the trucks is of simple construction, being formed essentially by the bedplate of the motor-generator set, to which are connected the journal boxes for the wheels and axles. The over-all height of this truck, as well as of the other truck of the equipment, is 56 in. above the rails. The track gage is 36 in.

The truck carrying the control equipment was completely fabricated by welding, insuring a maximum of strength. The full automatic switching equipment is mounted on the truck in such a manner as to obtain compactness without loss of accessibility or neatness. Half of the truck supports the alternating-current incoming line equipment, consisting of an oil circuit breaker, instrument transformers and disconnecting potheads. The other half supports the direct-current combined generator and reclosing feeder equipment, as well as the machine control panel and a small control power transformer. Such an arrangement assures maximum isolation of the a.-c. and d.-c. power systems.

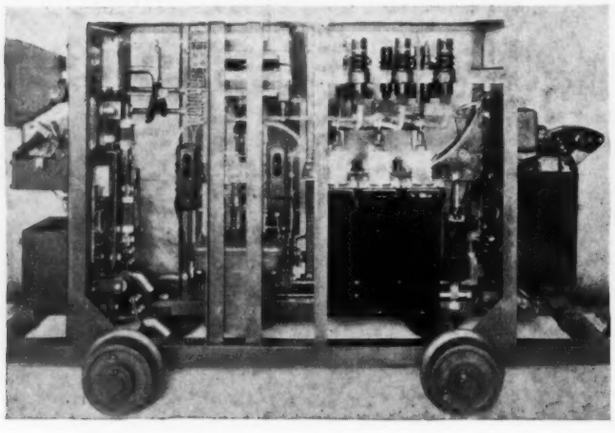
The control equipment functions to start the motor-generator set whenever the operator closes the master switch. If conditions are correct, the motor is connected to the line. When the generator voltage has built up to a value slightly higher than that of the feeder line the generator is connected to its load if load conditions are correct. The d.-c. reclosing feeder functions to trip on severe overloads. After opening on such an overload, the feeder recloses after a predetermined definite time if conditions are correct. The feeder will not close as long as connected load is above a predetermined value.

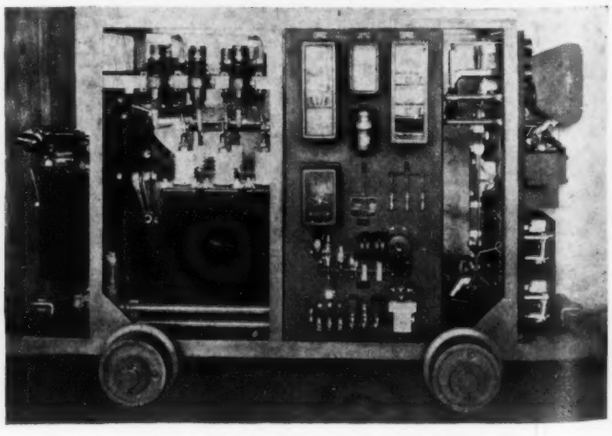
Complete protection is provided for the motor, consisting of a.-c. undervoltage, incomplete start, single-phase start, reverse phase rotation, phase balance (current), differential current, overspeed and machine and bearing thermal protection. Automatic restart is permitted after a shut-down due to a.-c. undervoltage, phase balance (single-phase operation) and continued overload which, if continued longer, might overheat the windings of the machine. The restart is permitted as soon as the abnormal condition is removed and starting conditions are correct. Shut-down by any other abnormal conditions will lock the motor-generator set out of service until the control equipment is reset by hand.

Protection for the generator includes reverse power, voltage directional and severe overload. The protective devices operate to open the feeder contactor until normal conditions return.



Two-truck substation consists of motor-generator set and full automatic control





Regional Power System Evolved in Face of Obstacles

By HENRY I. HARRIMAN
Vice-Chairman of Board New England Power Association

AN EXTENDED statement of the early history of the developments which led to the present New England Power Association was made by Henry I. Harriman at the March 17 hearing before the Federal Trade Commission. Mr. Harriman has been continuously active as an executive of the various companies since he and Malcolm G. Chace initiated the northern New England hydro developments in 1906. No one is better qualified than he to interpret the signifiance of each of the stages by which the present integrated system has been accomplished and to correlate the almost insuperable obstacles which were encountered and overcome with the successive moves in the evolution. His statement on the stand was one of the most comprehensive answers so far made to the general impugnment of motives and criticism of practices of those who had the vision to foresee the nation's present demand for electric service and the courage to lay the foundations for it. What he says here is in part from his statement at Washington and in part what he added in answer to questions from our editor.

NO RECITAL of the early years of what is now known as the New England Power System is complete or fair unless due weight is given to the physical, legal and financial difficulties which surrounded the development of water powers in New England a quarter of a century ago.

In 1907 long-distance transmission of electricity was in its very infancy. It was a highly speculative business. Conservative banking houses were not interested in our projects. The established electric light industry of the time vigorously opposed us at every stage of the development. State laws made difficult, if not impossible, the type of business we were attempting to establish. The right of eminent domain for transmission lines did not exist. There were interstate complications, too, from the fact that we proposed to generate power on a river between two states and to sell most of the energy in a third state, making necessary the formation of several corporate entities which could only be unified by a holding company.

These companies could not be financed in the same conservative way as companies having a recognized market and a recognized monopoly in a given territory. The business of the Connecticut River Company and the New England Power Company in those early days was highly competitive. It was competitive with all the electric light companies in whose territory it did business. It was competitive with every industrial steam plant. All of these factors made the business speculative and made it necessary to finance it as a speculative and competitive business rather than as a conservative monopolistic public utility.

Criticism has been made of the resort to construction companies. They were not organized for profit; none of these construction companies ever paid a dividend; nor did any profit accrue from the construction companies' operation to any person inside or outside the system. All the profits of construction were used to absorb discounts and the other financing expenses. This practice was well known to the regulating commissions in the states in which the company operated. The construction companies were actually organized to minimize expenses of financing. In order to sell the necessary bonds and stocks to provide the capital for the enterprises discounts had to be allowed. The construction company took the holding company stock at par, sold it at a discount and then charged enough profit on the construction job to offset the loss incurred in connection with the discounts. The original purchase at par is required by the Massachusetts statute.

Those disposed to criticise might well place themselves in the position of men who were risking their all in the belief that a vision would become a reality. But there is a great personal satisfaction to me as well as to the men who struggled with me through those dark years, when we see today a great power system which exceeds our wildest imaginings. It is a satisfaction to know that we have had something to do with bringing electricity, which in 1907 was a luxury, into hundreds of New England homes, where it is today the most valuable and the

Construction companies without profit amortized discounts on security issues.

High price of key property justified for integration of regional development.

Legal restraints necessitate voluntary association instead of corporate merger.

New England advanced five to ten years in electrical progress by consolidation.

least expensive of life's necessities. I have no apologies to make or regrets at any of the financial methods used in the early days of our company. They have been fully justified by the results.

Enterprise started in 1905

Malcolm G. Chace and I started our partnership in 1905. In that year our attention was called to the grant of a charter in 1902 for the development of power on the Connecticut River at Brattleboro, Vt. We acquired this New Hampshire charter, which limited the corporate activities to the construction of a dam opposite the corporate limits of the town of Brattleboro. No suitable site for a dam was disclosed by borings at Brattleboro, but one was found between the towns of Vernon, Vermont and Hinsdale, N. H. New charters were obtained from the legislatures of both states and the so-called Vernon development was begun in 1907.

The Vernon plant was capable of developing between 20,000 and 30,000 kw. The market, however, available in the states of New Hampshire and Vermont within reasonable transmission distance of Vernon was very limited, not more than 1,000 or 2,000 kw. In order to make the plant a financial success it was therefore necessary to secure entry into the large Massachusetts market for energy.

At that time the Massachusetts electric companies were devoted solely to the sale of electricity for lighting and small power uses. There were only one or two contracts in the entire state in excess of 250 hp.; rates fell, mostly between 2.5 and 15 cents per kilowatt-hour. Exclusive charter rights had been given these companies as to territory, and in order to make the Vernon hydro power available to larger industries than the local companies were prepared to serve, it was necessary to secure modification of the law. In 1908, then, it was provided that two companies could do business in a given town with the consent of the Massachusetts Gas and Electric Light Commission, provided the sales by the second company were limited to customers whose use exceeded 300 hp. and provided the company had obtained the necessary pole locations from the local authorities. The right of eminent domain was not granted until 1914.

Bonds of utility companies could not exceed their stock and the preferred could not exceed the common. All securities had to be issued at par or better and bond interest could not exceed 6 per cent. Financing under these restrictions was obviously impossible for a competitive power project with no monopoly of territory and no assurance of market, except in competition with the local companies or with the steam power plants of the prospective customers. In order to finance such an enterprise it was necessary to base the financial structure upon the issuance of bonds at a reasonable discount and carry them with a bonus of common stock.

Generated in two states, sold in third

Further than this, the power was being produced in two states and was to be sold largely in a third state. This, likewise, complicated the financial structure and made necessary holding companies, to tie together the various corporate structures in the different states. The Connecticut River Power Company of New Hampshire in 1907 replaced the two previous corporations; it developed the Vernon plant and built the transmission lines to the Massachusetts state line. For the purpose of transmitting power to the Massachusetts market, a Massachusetts company was incorporated under the name of the Connecticut River Transmission Company. Being an electric utility, its bonds could not exceed its capital stock. This made necessary the "Massachusetts Company," a voluntary association to hold all of the securities of the Connecticut River Transmission Company. A foreign company could not be used for this purpose because the laws of Massachusetts forbade a foreign corporation to own more than 50 per cent of the securities of a Massachusetts electric company.

Twenty-five years ago there were only three lines in the country with a voltage as high as 66,000 volts, only a very few with transmission distances in excess of 40 miles, and all of these were in the West or Middle West. New England conservatives were sceptical of the feasibility and reliability of such transmission. The existing utilities opposed the whole project at every step. They opposed the amendment of the law permitting a power company to sell large industrial service in the chartered territory of a local company. Through their financial affiliations they made it difficult for Mr. Chace and myself to do our financing. The pertinacity and determination of the promoters, however, overcame all these obstacles in time. A large factor in the subsequent growth was the recognition on the part of proprietors of industrial plants that opportunity to obtain large blocks of cheap hydro power greatly removed the restraints upon expansion of their industrial businesses. As long as they were dependent upon their own steam plants any sizable increase in their power usage either taxed the existing capacity of their plants or else made frequent enlargements of these plants necessary. Bulk power from the electric lines gave them an attractive degree of freedom in industrial operations. Consequently they became our customers. In the last ten years hardly an industrial power plant of any size has been built in New England Power territory.

Demand grew in pace with capacity

By the time the Vernon plant was completed it was evident that the demand for power would soon exceed the capacity of that plant. It was desirable to develop other sources. Attention was directed to the Deerfield River, which has a fall of about 1,500 ft. spread over some 30 or 40 miles. The country was rugged and the run-off rapid. The river was quickly seen to have little value for hydro-electric purposes unless the whole stretch could be owned and developed under one control and adequate storage created to equalize the flow. Two storage possibilities were disclosed: Somerset, with 1,000,000,000 cu.ft., and Davis Bridge, with 4,000,000,000 cu.ft. These sufficed to equalize the flow between 400 and 500 sec.ft. and indicated an ultimate development of 100,000 to 200,000 kw. of reliable power.

In 1910 a start was made to purchase the water rights on the river. More than 400 farms were bought with funds advanced by Mr. Chace, myself and our associates at heavy financial risk and without the advantage of the right of eminent domain. The water rights of five mills were also secured, but with the reservation on the part of the mill owners to the right to take 12,000,000 kw.-hr. annually from the system of the New England Power Company. It was also necessary to pay for the relocation of several miles of track of a railroad. Charles T.

Main made an appraisal of these rights and properties and placed upon them the value of $7,500,000 after deducting the value incident to the mill owners' reservation of the 12,000,000 kw.-hr.

These rights and properties were all conveyed to the New England Power Company for a consideration which involved 50,000 shares of common stock of the company, $454,500 in cash and $300,000 in notes, a total of $5,745,500. This was nearly $2,000,000 less than the appraised value, but it was accepted in order to give a safe margin to outstanding securities as against the real value of the properties conveyed. One-half of the common stock issued against the water rights went to the banking syndicate which sold the securities. The best proof of the conservative valuation at which the properties were sold is the fact that the New England Power Company was enabled to sell electrical energy in the Massachusetts market at a profit to itself in competition with the existing utilities and in competition with private industrial plants.

More of both rivers developed

The three lower plants of the Deerfield River, with a combined generating capacity of 18,000 kw., were placed in operation in 1912. No. 5 plant, with a capacity of 15,000 kw., followed in 1915, and soon thereafter the lines were extended from Worcester to Providence and connection made there with the tidewater steam plant of the Narragansett Electric Lighting Company. The original Vernon plant was increased by 16,000 kw. in 1921. The Searsburg plant contributed 5,000 kw. in 1922. The Harriman plant at Davis Bridge was started in 1923. Its capacity as originally planned was 35,000 kw., with a storage of 2,000,000,000 cu.ft. But by the purchase of Mountain Mills' pulp plant the capacity at Davis Bridge was increased to 45,000 kw. and a storage of 5,000,000,000 cu.ft. The increased head and storage available resulted in increasing the annual output by 45,000,000 kw.-hr.

The Sherman plant, like that at Searsburg, is an automatic plant, operated by remote control from the Harriman station. It went in during 1926 with an installed capacity of 7,000 kw. A 45,000-kw. addition occurred when the Bellows Falls plant was built in 1927-28. Last year Fifteen-Mile Falls was completed with a capacity of 140,000 kw. From this plant a 220-kv. transmission line was constructed to a substation between Lowell and Lawrence and from that substation other lines were built to connect directly with the large Edgar steam plant of the Edison Electric Illuminating Company in Boston. Within a few months another plant of 15,000 kw. on the Connecticut River at McIndoes will go into operation.

During this physical growth of the system there have been six major movements in the corporate structure of the New England Company. Four of them preceded the formation of the voluntary New England Power Association on January 2, 1926, and two were associated with it. In addition there were two major acquisitions that also involved temporary corporate set-ups, Worcester and Providence.

Worcester and Providence acquired

In 1926 certain interests which included the International Paper Company, Stone & Webster and F. L. Carlisle & Company approached the management of the New England Company with a view to purchasing its properties and placing them under the régime of the Northeastern Power Corporation. The directors of the New England Company accepted the proposal, and thereupon the new interests formed the New England Power Association, which took over the assets of the New England Company and set them up on their books at the price which they paid for them.

During that same year a syndicate consisting of Bodell & Company, Baker, Young & Company, Stone & Webster and Blodgett, International Securities Company and F. L. Carlisle & Company acquired control of the Narragansett Electric Lighting Company and the United Electric Railways Company, both in Providence. The Carlisle subscription was for the account of the New England Power Association. The Rhode Island Public Service Company was formed to make the acquisition and all of its common stock is now held by the New England Power Association. That move brought into the system the Providence market, which had already been tied physically to the system at the time when the transmission line was extended from Millbury to Providence in order to co-ordinate tidewater steam generation with the hydro generation on the rivers to the north.

During 1927 and 1928 the New England Power Association acquired a minority interest in the Worcester Electric Light Company by buying shares in the open market. On February 15, 1929, the association, having become aware that outside interests were on the point of acquiring control, entered into an agreement with the trustees of the voting trust which held control of the Worcester stock to acquire all their deposited shares at $226. The resulting cost to the association was $21,465,582. The book value on the Worcester Company's books stood at $6,778,572, although in a rate case before the Massachusetts commission the company claimed a value of $17,837,965; the Massachusetts commission assigned a value of $10,000,000, but the special master of the federal court on appeal found a value of $15,285,164. The price paid by the New England Power Association was admittedly high, but I consider, nevertheless, that there was equity in it for all three interests concerned, the Worcester consumers, the Worcester stockholders and the New England Power Association. Out of the deal the association got a property which was essential to its unity and integration as a regional system capable of passing on to the users throughout the territory the benefits of co-ordinated hydro and steam production.

Wealth added to New England

At the present time the hydro operations are saving upward of 200,000 tons of coal per year. The company employs about 8,000 people. Taxes paid to the states and communities amount to 11 per cent of the gross income. The system wealth added to New England over and above the value of the properties which were purchased amounts to something between $100,000,000 and $150,000,000, and this, of course, ignores all the enhancement in industrial values and activity which have followed the widespread availability of electric power for industrial uses. The company has pioneered in many things; it plays no politics and spends little for advertising. It co-operates energetically in the further development of New England industry and stability.

Frankly and positively, I feel that all these facts should be considered before any one proceeds to cast

aspersions on the financial and corporate maneuvers which local laws and fiscal expediencies made absolutely necessary in order to continue the evolution of the system as it outstripped the wildest dreams of those who had the initial vision and courage to risk their funds and their careers in laying the foundations for this community service.

Incidentally, I see no reason whatever for federal regulation of the interstate movements of energy which comprise a large percentage of all the kilowatt-hours produced and distributed in the five states in which the association operates. Interchange agreements covering energy crossing state lines provide for reference of disputes to a joint conference of the two commissions involved. This provision has worked satisfactorily, no occasion having arisen to provoke the question as to what agency would serve as mediator in case the two commissions failed to agree.

It is conservative to claim that New England is today five years or even ten years ahead electrically of the development it would be enjoying had the process devolved upon the growth of local companies at the rate which they had exhibited in the period preceding the entrance of the New England Power System into the picture with bulk energy from hydro sources later to be coordinated with tidewater steam production at Providence, Boston and Montauk.

▼

Cathode-Ray Oscillograph Tests Arrester Production

By O. ACKERMANN

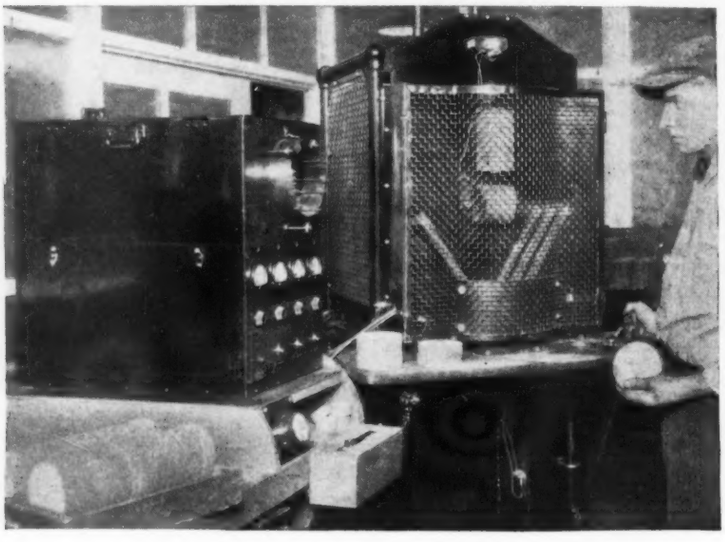
Circuit Breaker Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

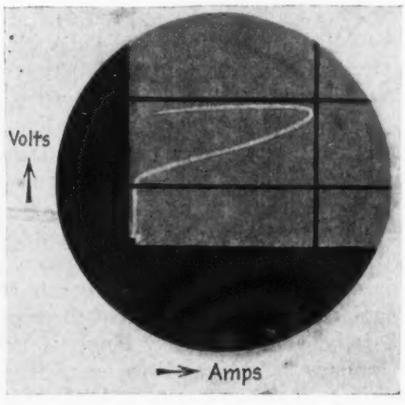
The criterion for acceptability of the unit blocks which make up the autovalve lightning arrester is the volt-ampere curve. The Westinghouse Electric & Manufacturing Company is using a cathode-ray oscillograph in connection with a surge generator for the purpose of testing each block in the production line before it is assembled in the arrester.

The oscillograph used for this purpose is of the glass tube type, developed in the Westinghouse company originally for television purposes. It has a filament heated cathode and must be operated on 4,000 or 5,000 volts if a fluorescent spot is to be obtained intense enough for the observation of rapid transient phenomena. The impulse impressed on the arrester element is generated by a 50-kv. surge set of 0.28 mfd. capacity. The whole rectifier with condensers, surge circuit and safety devices occupies a floor space of 29x36 in. One single operation inserts the arrester block into the surge circuit, closes primary and secondary contacts and releases the surge. At the same instant, the corresponding volt-ampere curve appears on the fluorescent screen, traced in about one fifty-thousandth of a second by the deflection of the cathode-ray beam in proportion to voltage and current in the arrester. The oscillogram is well visible from a distance of 2 to 3 ft. in a half-darkened room, so that the performance of even several thousand operations during one day does not put a particular strain on the eyes of the operator.

The screen bottom of the cathode-ray tube is partly covered by a mask, on which limits of characteristic coordinates are marked in heavy black lines. The lower line marks the potential below which the arrester should not pass current, the upper line the voltage to which the arrester must reduce the impressed surge. The ratio of the two ordinates is 2.5 to 1. The maximum current for this routine test is 500 amp. If a volt-ampere curve at any point exceeds the lower or upper limit set by the characteristic horizontal lines the particular arrester block is rejected.

Experience has shown that changes in characteristics are associated with small fluctuations in the composition of the fundamental ingredients or in processing. The indications given by the oscillograph disclose these departures at once and the processing of the units is therefore under immediate control.





Cathode-ray oscillograph made safe and expeditious for the production test

Rate Schedules Vary Widely for Pipe-Line Pumping

The great and apparently unnecessary diversity of rate forms and structures of electric utilities has been brought into prominence by recent efforts toward concerted action for development of electric load in service to oil, gasoline and gas pipe lines. Pipe-line loads cannot be obtained on a scale commensurate with the national extension of these lines so long as different utilities that might serve pumping stations on the same line insist upon the preservation of individualities in the contracts they offer. Those familiar with electricity rate structures and contracts know that there is little uniformity in them, but not until a number of contracts are brought together for comparative analysis does one appreciate how great the differences actually are. It is not contended that all rate values be the same, but that a similarity of rate forms would be advantageous.

Such an analysis was presented by R. E. Keller, Electric Bond & Share Company, reporting as chairman of the committee on rates to the Electric Utilities Power Conference as Applied to the Petroleum Industry, recently held at Tulsa, Okla. The committee studied 47 different rate forms, of which

28 rates are applicable to pipe line pumping.
28 rates are applicable to oil well pumping.
20 rates are applicable to oil well drilling.
21 rates are applicable to refineries.
23 rates are applicable to one class of service only.
7 rates are applicable to two classes of service.
5 rates are applicable to three classes of service.
12 rates are applicable to four classes of service.

Some small comfort can be taken from the fact that substantial agreement is shown in type of rate. Of the total, 37 are block-Hopkinson, four are modified block-Hopkinson and six are straight block rates.

It is in the determination of billing demands that the independent thinker finds most room for his pet ideas. Here they are:

5 rates based on connected load.
13 rates highest 15-minute period, monthly demand.
12 rates highest 30-minute period, monthly demand.
4 rates highest 15-minute period, twelve months ratchet demand.
3 rates highest 30-minute period, twelve months ratchet demand.
3 rates average four highest 15-minute periods, monthly demand.
1 rate average four highest 15-minute period, twelve months ratchet.
2 rates average two lowest of three highest 15-minute periods, twelve months ratchet.
1 rate highest 15-minute period, 50 per cent ratchet.
1 rate highest 15-minute period, perpetual ratchet.
2 rates, no method of determination given.

Inclusions of clauses regarding power factor, fuel cost variations, supply voltage and discounts exhibited little regularity of appearance and form in the 47 rates studied.

Power Factor Clause:

Of the total number of rates 21 included a power-factor clause.
2 rates were based on kva. measurement of demands.
24 rates did not include power-factor clause.

Of the 21 rates with power factor clauses:
3 penalized for low power factor only.
12 contained penalty and bonus.
6 contained neither penalty nor bonus.
8 used average monthly power factor.
7 used power factor taken at time of customer's maximum demand.
6 established base power factor, but gave no method for its determination.

Fuel Clause:

Of the 47 rates, fuel clauses appeared in 27.
Of the 27 rates with fuel clauses:
1 added for increased cost of fuel only.
26 added and subtracted from monthly bill in accordance with fluctuations in prices of fuel.

Service Voltage:

The voltage of supply specified in the rates ranges from 440 to 13,200, but many of the schedules do not specifically state the voltage. The percentage of each is therefore indeterminable.

Discounts:

The discounts included in these rates were as follows:
Prompt payment.
Prompt payment and load factor.
Prompt payment-load factor and primary metering.
Prompt payment and off peak.
Prompt payment and quantity.
Term discount and high power factor.
Term discounts.
Prompt payment and primary metering.

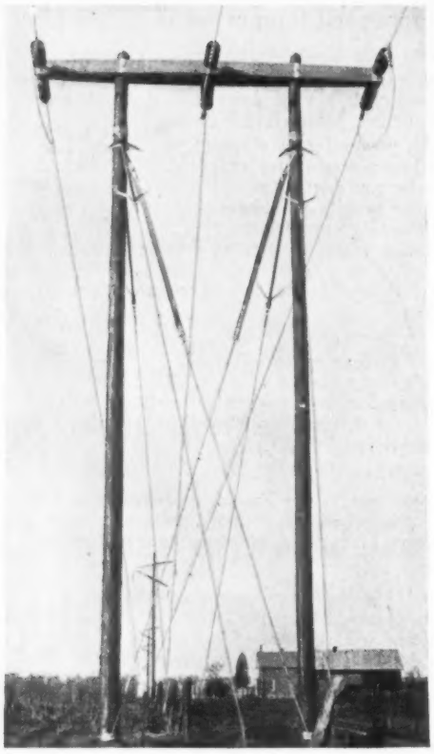
Of the 47 rates studied, only 28 were applicable to pipe-line pumping. The accompanying tabulation shows the appearance of specific stipulations in these. In the cases in which the horizontal totals are greater than 28 it means that the same stipulations appear two or more times in the same agreement.

Analysis of Clauses Contained in Oil Pipe Line Pumping Contracts and Rates

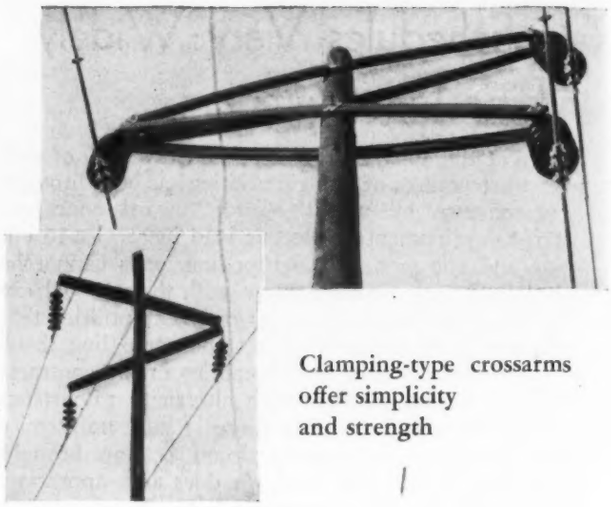
Clauses Specify	Clauses Omitted	Clauses Appear in Contract	Clauses Appear in Rate	Clauses Appear in Rules and Reg.
1. Date of agreement	2	26	..	..
2. Name of parties	2	26	..	..
3. Purpose of contract	8	20	..	..
4. Consideration	16	12	..	..
5. Amount of power contracted for	4	24	..	..
6. Provision for increased use of capacity	5	18	1	6
7. Location of operation served	5	22	..	1
8. Point of delivery defined	10	14	..	5
9. Substation and line construction and maintenance	18	8	1	2
10. Rights and easements	13	12	..	3
11. Metering high or low tension	25	..	3	..
12. Clause making rate part of contract	2	26	..	..
13. Application	..	13	17	5
14. Rate proper	..	11	17	..
15. Determination of demand	1	18	15	4
16. Power factor	14	6	8	..
17. Fuel clause	12	6	10	..
18. Minimum	5	14	12	..
19. Discounts	5	12	14	3
20. Incidental lighting	15	9	6	..
21. Resale provision	15	13	..	..
22. Provision for rate changes	13	11	2	1
23. Method and place of payment of bills	11	16	2	1
24. Waiver of default	15	13	..	..
25. Reimbursement for cancellation of contract	16	7	..	5
26. Term of contract extension and termination	1	25	4	6
27. Successors and assigns	12	16	..	1
28. Rules and regulations a part of contract	15	12	2	3
29. Meter accuracy	11	13	..	4
30. Failure of meters—billing adjustment	19	7	..	2
31. Inspection and approval of customer equip't	11	14	..	6
32. Right of ingress and egress at reasonable hours	3	16	..	9
33. Force majeure-continuity of service	2	22	..	8
34. Public liability	2	20	..	9
35. Suspension for non-payment	7	15	2	8
36. Definition of month	15	12	1	..
37. Company to own, install and maintain meters	7	15	..	6

Ready for Lightning

By W. H. KNUTZ
Midland United Company, Chicago, Ill.



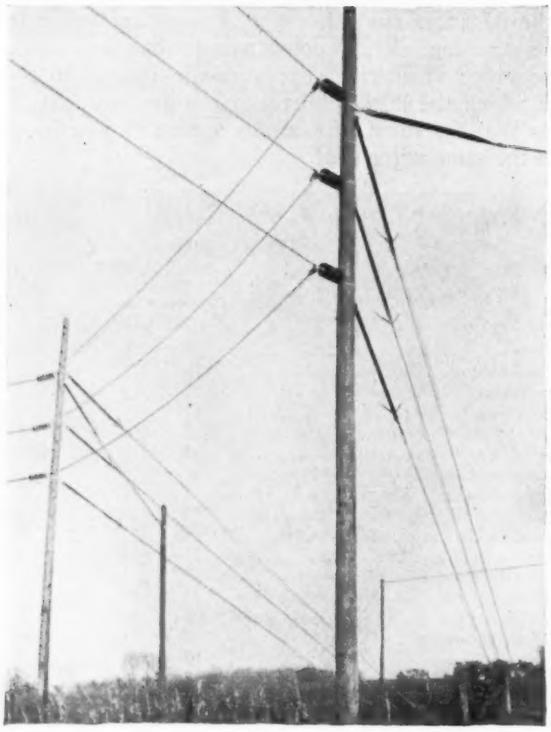
Double-plank arm construction for dead ends



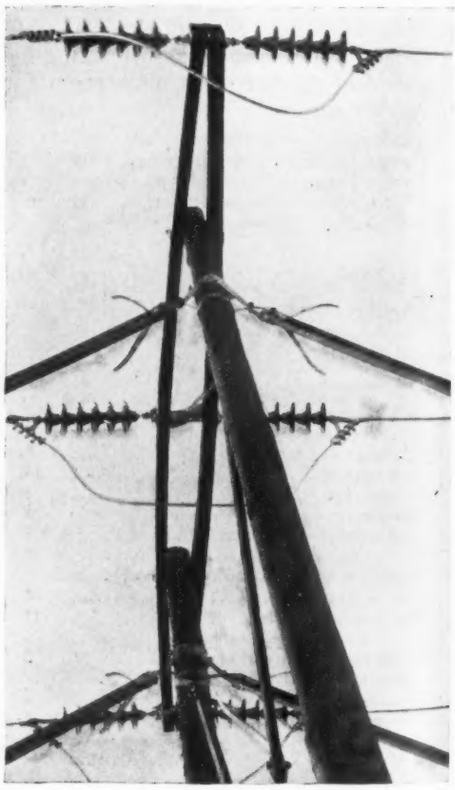
Clamping-type crossarms offer simplicity and strength

Performance of a 43.2-mile, 66-kv. line between Plymouth and Goshen, Ind., erected last fall by the Northern Indiana Public Service Company, may develop valuable facts during this year's lightning season.

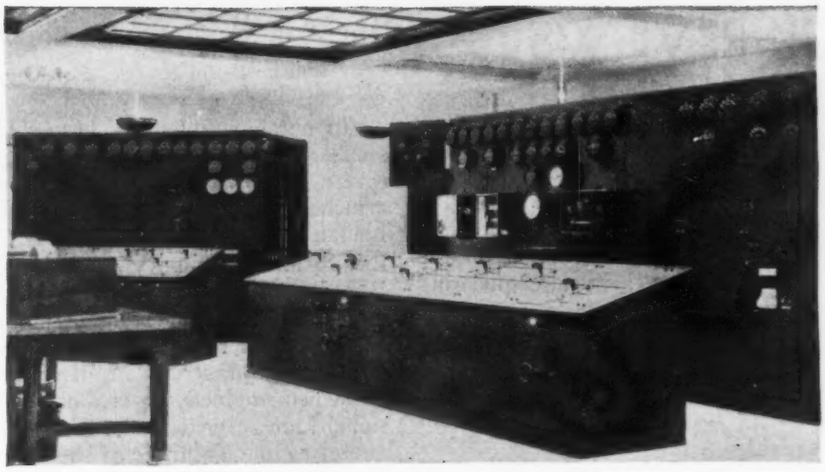
The line has been built with 45-ft. creosoted pine poles; normal span 300 ft. The 336,400-circ-mil A.C.S.R. conductors have a 22.8-in. sag at 60 deg. F. with a clearance of 25 ft. from bottom wire to ground. Insulator unit centers are 4¾ in. apart. Six units are used on the top conductor suspension, five on the middle and three on the bottom. Minimum conductor spacing on straightway sections is 9¼ ft. Special hardware is used for insulator hangers and clamps for the double-plank wishbone arms. Anchor structures consist of wood H-frames and corners are made on two vertical configurations. All guys are insulated with 9-ft. wood strains provided with arcing horns. Transpositions are made by reversing the arms on one pole and rolling the conductors. The impact flashover value of this line will exceed 1,800 kv. The normal induced charge will probably not exceed 1,600 kv. The clamping action of the hadware and the use of double - plank arms will reduce shattering by lightning. The line terminals are protected by arresters. Additional protection in the form of grounded arcing gaps or fused gaps may be used.



Typical guyed angle construction



How the wood strain members are attached



Straight sections of switchboard may be so located that advantages of a circular board are secured without its higher cost

READERS' FORUM

Appealing to Public Convenience May Augment Transportation Load

To the Editor of the ELECTRICAL WORLD:

The following ideas came to the writer very forcibly the other day while waiting for a street car and I am passing them along:

One needs very little imagination to envision the great waste of passenger space in automobiles and the vast amount of street space occupied compared to what the condition would be if the occupants of these automobiles were transferred to the trolley cars and buses.

In most any city one would find the majority of automobiles with one person in each and very few with more than two or three persons. In the business sections, in addition to the almost continuous columns of automobiles either in motion or waiting for traffic signals, there would be solid rows of automobiles parked along the curb and at other parking places. At the same time, the trolley cars and buses, which occupy much less street space per person than automobiles, are passing through the streets with room for those now riding in private automobiles.

Considering the inconvenience and delay in parking, the uneconomical operation due to frequent starting and stopping and the hazard of accidents due to crowded traffic, there must be some strong offsetting reasons why so many people prefer their own vehicles to the public vehicles. If these reasons could be singled out and overcome by the transportation company there would be a change in the situation, to the profit of the company and the added convenience and safety of the public.

Probably the outstanding reason that would be found is the fact that one's own car goes when one wants it, whereas the trolley and bus go on schedules which may cause one to wait for a while. People sometimes forget that the delay in parking may more than offset any advantage in starting out promptly. The private cars are usually cleaner and more comfortable and have better ventilation than public cars.

No one would advocate the idea that the people should do away with their private cars, as these provide such good means for healthful and harmless entertainment and recreation, but present conditions in the cities cannot be improved until there is considerable curtailment of the use of automobiles in the city streets.

As far as the transportation company is concerned, a bold stroke is needed to recapture the lost passenger traffic. Some executive with vision and nerve must realize the conditions and make the necessary changes to attract the public from its own cars. Standards of former years will not do. There must be a willingness to give the public all the advantages it has with its own cars without the disadvantages. Of course, it will be necessary to obtain the sympathy and co-operation of the public and city officials to reach the final goal, but this will have to be gained through patience and with all the cards on the table. Before any plan is decided upon, the city officials and prominent residents should be brought into conference so that whatever is decided becomes a quasi-official affair. After this, there should be much publicity of the proper kind, and possibly the starting of the new plan should be made the occasion of a public celebration. This should be on the basis that it is a public affair, in which the city as a whole is benefited, and that it is not merely a scheme to help the transportation company.

All this may mean considerable expenditure of money on rolling stock and, if rails are used, on the roadbed, but it means more than expenditure of money. It will require an eagle eye and an open mind to change any operation necessary to meet changing conditions or even new whims of the public.

As to the celebration, there is no reason why this should not last a week, but made more than a speech-making and band-playing affair, by special inducements to get people to ride. Why not sell special tickets for a nominal amount, say 50 cents for an unlimited number of rides during the celebration week? In the newspapers and on car cards could be printed each day some gripping story that will help the attitude of the riders toward the transportation company.

If the company has solved the problem of providing the transportation that the public likes, the public will continue to ride after the celebration is over. If not, the company made a wrong guess, either as to cause or remedy. The following are suggested as some of the ways of getting people to ride in trolleys and buses:

1. Have clean, well-ventilated cars with proper temperature.
2. Have comfortable seats.
3. Have easy access, especially considering elderly people.
4. Have courteous employees.
5. Have frequent service.
6. Have as fast service as conditions will permit.
7. Have the best possible routing.

S. W. MAUGER.

General Electric Company,
Schenectady, N. Y.

BOOK REVIEWS

Electrical Laboratory Studies

By Walter Lyman Upson. McGraw-Hill Book Company, New York. 182 pages, illustrated. Price, $2.

A laboratory manual evolved by the author in the development of a course for junior electrical engineering students at Washington University, St. Louis. It is calculated to encourage the spirit of inquiry and exploration on the part of the student entering electricity by the customary route of direct-current circuits and the characteristics and performance of direct-current machinery.

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Electric Circuit Analysis

By Michael G. Malti. John Wiley & Sons, New York. 377 pages. Price, $4.50.

"The material presented in this book is intended to acquaint the student of electrical engineering with the principles and laws of electric circuits." The first three chapters, about a tenth of the book, are devoted to the study of complex numbers, vectors and the theory of sine functions. From that point on the application of these mathematical tools to successively more complicated circuits and conditions is developed. Later chapters deal, for example, with Fourier's series and harmonic analysis, transients, circuits with distributed characteristics. In the last named the hyperbolic equations of a transmission line are developed.

A generous collection of numerical problems accompanies each chapter. There probably are more of them than can be worked in the time usually devoted to such a course, but the drill of solving most of them would go far toward giving the student a solid technical foundation—the one thing he can get most effectively in college. The presentation is clear, the choice of material good, as to both scope and depth.

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Theorie der Wechselströme

By Dr. Ing. Alfred Fraenckel. Julius Springer, Berlin, Germany. 260 pages.

This is the third edition, involving two sets of revisions since the original publication in 1914. In recent years the knowledge of alternating-current theory required to keep abreast of current technical literature has greatly broadened. The present book is an introduction to this wider field; it should serve well as a text book for upper-class electrical engineering students.

In agreement with modern thought, vectors, complex quantities and, in the consideration of transients, symbolic notation are used. Also, in addition to the familiar circle diagram, charts of higher plane curves are introduced toward the end of the book. Among the more advanced topics are transients on opening and closing an alternating-current circuit, networks, simplified equivalents for distributed inductance and capacitance, and reflected waves. The presentation is that of an experienced teacher who is not afraid to use enough verbal explanations to make the mathematics plain.

The Autobiography of an Engineer

By William LeRoy Emmet. Fort Orange Press, Albany, N. Y. 213 pages. Price, $2.

An autobiography has been added to the much too small group which engineers have contributed to literature. This one is written in the chatty vein of an armchair conversation at the club. One finds in it a human picture of the Naval Academy, the old navy, the Spanish war navy and the new electrified navy. But, more, it illuminates the memory of the struggling days of Sprague, Westinghouse, Rice, Insull and a host of other pioneers. The young engineer will do well to absorb the commercial and psychological obstacles which renowned engineers overcame on their way to professional fame. Incidentally, it also draws aside the curtain and gives one a glimpse of the very human figures which comprise the soul of a big corporation.

Much will be found in the work to round out the picture of the early Niagara development, recently presented by Edward Dean Adams, and more about steam turbines and marine electrification. Especially there is an intimate portrayal of the mercury turbine concept and its fruition to commercial practicality as a result of the indispensable encouragement of Samuel Ferguson and T. H. Soren.

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Schaltungsbuch fur Gleich und Wechselstromanlagen; 3. Auflage

By Emil Kosack. Julius Springer, Berlin, Germany. 213 pages, 292 illustrations, two plates.

Nearly 300 d.c. and a.c. circuit connections applicable to generators, motors and transformers and to lighting, power and substations have here been assembled, with explanatory text. Tracing of the complete current paths is facilitated by inclusion of machine circuits diagrammatically, instead of stopping at apparatus terminals. Many of the diagrams relate to polyphase motor speed and power-factor control; in fact, it is somewhat of a surprise to discover how many such methods are in use. For the American engineer these will probably be of more interest than the others, in view of the activity of European inventors in that particular field.

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The Smoothing of Time Series

By Frederick R. Macaulay. National Bureau of Economic Research, New York. 172 pages.

More and more the engineer is realizing the important bearing of economic problems upon his field. Few persons called upon to make use of statistics in the past have been expert mathematicians, so that those engaged in scientific study and the analysis of large masses of numerical data have not always been able to benefit by the more involved methods of modern statistical theory.

"The Smoothing of Time Series" discusses some of these more refined methods in a remarkably simple and non-technical style, considering the complexity of the problems. Instructions for applying the various graduations in a time series can easily be followed. Subjects discussed include curve fitting and various types of graduation, such as by simple moving averages, parabolic summation, the measurement of seasonal fluctuation, etc.

Men of the Industry

S. M. Kintner Named Westinghouse Vice-President

S. M. KINTNER, who has just been elected vice-president of the Westinghouse Electric & Manufacturing Company in charge of engineering, as announced in the May 2 issue of the ELECTRICAL WORLD, is well known for his research and engineering work. Since 1920 he has directed the research activities of the Westinghouse organization and last year he broadened his duties when he became assistant to

Vice-President Rugg on engineering supervision.

Through association with Professor Fessenden of the University of Pittsburgh Mr. Kintner became interested in radio telegraphy and telephony, and it was in this field that he did his most successful experimental work. Following graduation from Purdue University he joined the faculty of the Western University of Pennsylvania, now the University of Pittsburgh, associated with Professor Fessenden, serving as instructor and later as professor in the department of electricity. Here he made original investigations in X-ray, radio telegraphy, etc.

In 1903 he became identified with the Westinghouse Electric & Manufacturing Company as an engineer on research of high-tension phenomena, lightning arresters, line and apparatus protection, and four years later was assigned to the railway engineering department and had charge of alternating-current railway motor design. In 1911 he joined, in the capacity of general manager, the National Electrical Signalling Company, formed to develop the discoveries and patents of Professor Fessenden. This company was reorganized as the International Radio Telegraph Company in 1917 and Mr. Kintner served at different times as vice-president and as president before selling the company to and again associating himself with the Westinghouse company in 1920.

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F. E. Kruesi Assumes Broader Executive Duties

FRANK E. KRUESI, an assistant to the president of the Middle West Utilities Company since 1926, has been elected a vice-president of that company. Mr Kruesi's public utility career has been spent entirely with the Insull interests, starting in 1908 in the construction and operating departments of the Commonwealth Edison Company of Chicago. This connection was followed by association with the Public Service Company of Northern Illinois as construction engineer at Streator, the Illinois Northern Utilities Company as operating engineer at Dixon and the Freeport Railway & Light Company as manager, each of these connections covering a period of two years. In 1916 he was transferred to the Chicago office of the Middle West Utilities Company. During the six years following his discharge from the army after the World War he was located in Seattle, Wash., as Pacific Coast manager of Fazar & Company. Early in 1926 Mr. Kruesi returned to the Middle West Utilities Company as an assistant to the president.

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St. Louis Utility Announces Promotions

THE FOLLOWING ASSIGNMENT of duties has been announced by the Union Electric Light & Power Company:

George K. Miltenberger has been promoted to the position of general superintendent of the company and Stanley Stokes has been made consulting electrical engineer. Both were formerly assistant vice-presidents. Mr. Miltenberger retains his titles as assistant to the president of the East St. Louis & Suburban Company and of the Mississippi River Power Company.

Albion Davis, who has been chief engineer of the Mississippi River Power Company, has been appointed chief hydraulic engineer for the Union Electric Light & Power Company, while J. Turner White, Jr., has been placed in charge of the operation of the new hydro-electric power plant on the Osage River at Bagnell, Mo.

M. E. Sampsell Elected President of S.E.D.

MARSHALL E. SAMPSELL, president of the Central Illinois Public Service Company, was elected president of the Society for Electrical Development by unanimous vote of the S.E.D. directors April 29. He succeeds Charles L. Edgar, president of the Edison Electric Illuminating Company of Boston, who served as acting president of the society since February, 1930. Bringing an extended knowledge of association work

to his new office, including a background of two years' service on the board of the society, Mr. Sampsell is especially qualified to give leadership to the co-operative movement represented in the society.

A native of Marshall, Tex., Mr. Sampsell was graduated from the University of Chicago in 1896 and from the Chicago College of Law in 1899. He was clerk of the United States Circuit Court for the Northern District of Illinois from 1902 to 1907. He began his public utility career in 1903 as receiver for the Chicago Union Traction Company and other affiliated street railway companies. During the several years of this receivership Mr. Sampsell took an active part in the street railway negotiations of that period, which resulted in the adoption of the famous Chicago traction settlement ordinance of 1907. Mr. Sampsell is a director of the Middle West Utilities Company and president of the Central Illinois Public Service Company and Wisconsin Power & Light Company, two of its largest subsidiary companies. He has served as president of the Illinois Electric Railway

Association and of the Great Lakes Geographic Division of the National Electric Light Association, has been vice-chairman of the Public Relations National Section, chairman of the Commercial National Section and is now second vice-president of the National Electric Light Association.

▼

F. R. Phillips New President of Philadelphia Company

FRANK R. PHILLIPS, who was elected president of the Philadelphia Company, as announced in the May 2 issue of the ELECTRICAL WORLD, has been senior vice-president of that company for the past two years. Mr. Phillips has been connected with utilities in Pittsburgh for the past 21 years and is a nationally known figure in the public utility in-

dustry. He went to Pittsburgh in 1909 to assist in the development of the street railways of that city. In 1910 he was made superintendent of equipment of the Pittsburgh Railways Company, which position he held until July, 1923, when he was made acting general manager for the receivers. Upon the lifting of the receivership in February, 1924, he was appointed mechanical and electrical engineer and also representative of the company to the Traction Conference Board. On September 1, 1926, he was elected vice-president and general manager of the Duquesne Light Company and its subsidiaries and in April, 1928, was elected vice-president of the Equitable Gas Company and its subsidiaries. On May 24, 1929, he became senior vice-president of the Philadelphia Company and president of its affiliated corporations. He has been active in the American Electric Railway Association, having served on many important committees, is a past-president of the Pennsylvania Street Railway Association, the American Electric Railways Engineering Association and the Pennsylvania Electric Association and is a member of the American Institute of Electrical Engineers, the Engineers Society of Western Pennsylvania and other similar societies.

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HARRY K. CUTHBERTSON, of Peru, has been appointed by Governor Harry G. Leslie as a member of the Public Service Commission of Indiana to succeed Calvin F. McIntosh, whose term expired May 1. Mr. Cuthbertson is a state senator and a graduate of the University of Chicago.

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R. F. PACK, vice-president and general manager of the Northern States Power Company since 1916, has been elected president of that company. The office has been held by J. J. O'Brien, who, as president of Byllesby Engineering & Management Corporation and Standard Gas & Electric Company, has also served as president of most of the subsidiary and affiliated companies.

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OBITUARY

Richard R. Young

RICHARD R. YOUNG, vice-president of the Public Service Electric & Gas Company, Newark, N. J., in charge of sales, died in the Roosevelt Hospital in New York April 30. Mr. Young entered the public utility industry in 1892 as an employee of the Omaha Gas Company, a subsidiary of the United Gas Improvement Company of Philadelphia. Seven years later he removed to the East as agent of the Passaic office of the Paterson & Passaic Gas & Electric Company. In 1902 he was made assistant secretary of that company and subsequently Passaic agent of Public Service Corporation of New Jersey, formed in 1903. He was appointed agent of the Essex division of Public Service Corporation of New Jersey, gas department, with offices in Newark. When Public Service Gas Company was formed, in 1909, he was made Essex division agent and a year later took the same position with Public Service Electric Company upon its organization. Four years later he became sales manager of the two companies. When the position of vice-president in charge of sales was created, in 1926, he was assigned to that office. Mr. Young was born in Forest Hill, a suburb of London, England, in 1866, and came to this country twenty years later. He is a brother of Percy S. Young, vice-president in charge of finance of the Public Service Corporation of New Jersey. He was a member of many committees of the National Electric Light Association, American Gas Association, New Jersey Gas Association and other organizations.

▼

ELLIOTT C. SMITH, president of the Middle West Gas & Electric Company, and an officer of several smaller utility properties, died April 26 at his home in Pasadena, Cal. A native of Philadelphia and a graduate of the University of Pennsylvania, Mr. Smith spent the first part of his career in the railroad field. He was 70 years of age.

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ROBERT SCHOFIELD, formerly an electrical engineer for the city of Washington, Ind., and for the power and light company there, died suddenly at his home in that city recently. Mr. Schofield was born in Manchester, England, and came to this country when 18 years old, settling in Kentucky and then going to Washington.

•

NATHAN B. AMBLER, hydro-electric engineer and superintendent of the Wilson Dam hydro-electric plant, died suddenly at Florence, Ala., April 11, in his fifty-fifth year. A native of Chatham, N. Y., Mr. Ambler received his degree of E.E. at Columbia University in 1900. He first took a position with the Metropolitan Street Railway, New York, and later joined the electrification department of the Long Island Railroad, where he continued as foreman of substations until 1907, when he went to Messina, N. Y., with the Aluminum Company of America. Two years later he took a position with Gibbs & Hill of New York and in 1911 joined the Toronto Power Company as superintendent of its Niagara Falls plant. Ten years later, when this company sold out to the Ontario Hydro-Electric Power Commission, Mr. Ambler went to New York with the firm of McClellan and Junkersfeld. In 1924 he joined Hugh L. Cooper & Company's organization as chief electrical inspector on the U. S. government's hydro-electric plant at Muscle Shoals. In the early part of 1926, when this plant was completed and turned over for operation, he became plant superintendent by special appointment of the Secretary of War, which place he held at the time of his death. Mr. Ambler was a member of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

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New England Power Association

Originally functioned largely as wholesaler
Local distributing companies acquired since 1926
Control now vested with paper interests

Legal Obstacles and Investor Hesitance Make Financing Complex

THE New England Power Association, a voluntary association under the laws of Massachusetts, was formed under a declaration of trust in January, 1926. It is, in effect, a holding company, owning the majority and in some cases all of the voting stock of some 48 or more subsidiary corporations. Initially the enterprise generated, transmitted and sold power at wholesale to large manufacturers in the days when the electric utilities were purely local organizations. The New England Power system provided reliable power cheaply enough to induce substitution of purchased power for self-generated power within the large industrial establishments.

The system had its origin in 1907, when Henry I. Harriman and Malcolm G. Chace began the construction of a hydro-electric plant on the Connecticut River near Vernon, Vt., with a transmission line to Fitchburg, Mass. The project was interstate from the beginning.

The sponsors of the project secured the right to construct a dam on the Connecticut River between Hinsdale, N. H., and Vernon, Vt. Title to the land in New Hampshire was vested in a company known as the Connecticut River Power Company of New Hampshire and title to the land in Vernon was vested in the Connecticut River Power Company of Vermont, two companies being necessary owing to the location of the properties. A construction company was then formed by Chace & Harriman, known as the Chace-Harriman Construction Company, and the two Connecticut River Power Companies were merged under the name of the Connecticut Power Company of New Hampshire. The construction company was commissioned to build a dam and power plant site at a cost to the Connecticut River Power Company of New Hampshire of $4,000,000 to be paid in bonds of a principal amount of $2,000,000; 5,000 shares of preferred stock with a par value of $500,000, 14,800 shares of common stock with a par value of $1,480,000 and $20,000 in cash.

In order to finance the enterprise a holding company, known as the Connecticut River Power Company of

The Federal Trade Commission's inquiry into the New England Power Association revealed a corporate history differing materially from others so far called to Washington. Transition from wholesaling to retailing, close affiliation with non-utility interests, skirmish between intrenched and invading interests, withdrawal of other utility groups are factors which account for the difference. Massachusetts laws lead to still further complexities and departures.

Maine, was organized to hold the stock of the Connecticut River Power Company of New Hampshire. Bonds of the Connecticut River Power Company of New Hampshire to a total of $2,000,000 were issued. These bonds, together with four shares of the common stock of a par value of $100 of the Connecticut River Power Company of Maine for each $1,000 of bonds, were transferred to a syndicate which agreed to procure purchasers at a price which would net the Chace-Harriman Construction Company $850 for each block. Under this method $1,700,000 was realized. From the balance of the securities 1,000 shares of common stock and 1,000 shares of preferred stock with a par value of $200,000 were given to the syndicate, composed of Baker, Ayling & Company, Malcolm G. Chace and Henry I. Harriman, for services; 4,800 shares of common stock were given as a bonus in connection with the sale of $1,200,000 principal amount of Massachusetts Company bonds, while 6,200 shares of common stock and 4,000 shares of preferred stock were distributed to stockholders of the Chace-Harriman Construction Company as a dividend. The par value of the 4,800 shares of common stock given as bonus in connection with the bond sale was $480,000 and the par value of the common stock distributed was $1,120,000.

Meanwhile the Connecticut River Transmission Company was organized to transmit and distribute the power to be generated by the Connecticut River Power Company of New Hampshire. The transmission company was to own the lines and issue in payment therefor common stock to the Massachusetts Company. The Massachusetts Company, in turn, issued bonds to the Chace-Harriman Construction Company in payment for the lines to be constructed.

Deerfield River rights

Meanwhile Messrs. Chace and Harriman, between 1907 and 1909, secured certain lands with water rights on the Deerfield River, some of which were subject to the restriction that the Deerfield company should have the right to receive a maximum of 12,000,000 kw.-hr. per year from any hydro-electric plant built on these lands. This right was to last for a period of 999 years.

The New England Power Company was organized in 1911 under the Massachusetts laws to own and operate the hydro-electric developments which the construction company was to build upon certain of the lands which it acquired from Chace & Harriman. In 1926 the New England company disposed of the rights involved to the New England Power Company.

Meanwhile, in 1912 the Rhode Island Power Transmission Company was organized by the Deerfield Construction Company to operate transmission lines and substations in Rhode Island to tie in with the steam station of the Narragansett Electric Light Company at Providence.

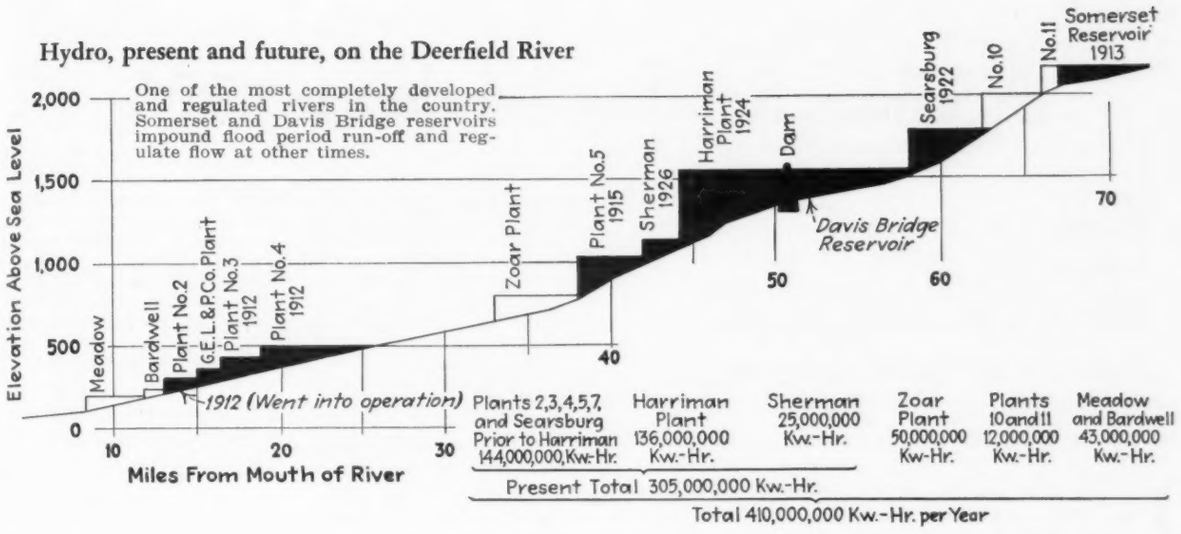
Three small companies were acquired in the vicinity of Bellows Falls, Vt., and the Bellows Falls Power Company was organized to control these companies.

In 1914 the New England Company, a Massachusetts voluntary association, was organized as a holding company to centralize control of all the constituent operating companies under one head. The Massachusetts Company was eliminated and the Connecticut River Transmission Company was merged with the New England Company. No mergers or consolidations took place until the reorganization of the New England Company into the New England Power Association in the early part of 1926. In 1923 the Deerfield Valley Company was organized to operate some paper mill properties acquired by the New England Company. In 1925 the Mascoma Light & Power Company, a holding company controlling the Grafton County Electric Light & Power Company and the Hartford Water Company, was acquired.

New England Company launched

When the New England Company was launched an issue of first mortgage bonds to a total of $30,000,000 was authorized, the initial issue being designed to retire 1,200,000 principal amount of Massachusetts Company bonds and to purchase property from the Deerfield Construction Company. In connection with the purchase of the Massachusetts Company, a closing balance sheet of that company shows the principal assets of the Massachusetts Company which were received by the New England Company to include cash of $495,000 and 7,000 shares of common stock of the Connecticut River Transmission Company at a ledger value of $700,000. The liabilities assumed by the New England Company included bonds to principal amount of $1,187,000. The net assets amounted to $10,000, represented by or equivalent to the par value of the capital stock of the Massachusetts Company. The New England Company paid 7,500 shares of its own stock with a par value of $750,000 for this $10,000 of net assets to the Massachusetts Company. This was construed by the commission's examiner as a write-up in the ledger value of the assets of $740,000. The Massachusetts Company had previously issued capital liability to a total amount of $1,197,000, of which $10,000, or less than 1 per cent, was capital stock. The Massachusetts Company issued to the Chace-Harriman Construction Company 100 shares of its capital stock, of a par value of $10,000, for 100 shares of the Connecticut River Transmission Company of equal par value.

The Chace-Harriman Construction Company exchanged the 100 shares of capital stock of the Massachusetts Company to the Connecticut River Power Company of Maine for 7,200 shares of the common stock of that company. In other words, the Connecticut River Power Company of Maine paid common stock of a par value of $720,000 for the Massachusetts Company common stock with par value of $10,000. Some of the difference, however, was attributed to "valuable services." The opening balance sheet of the New England company shows plant and property account of $1,700,000 and this is offset by an account payable to the Deerfield Construction Company of the same amount. The New England Company liquidated the account payable to the Deerfield Construction Company by issuing $1,700,000 principal amount of first mortgage bonds to the construction company. The capital liabilities of the New England Company at organization included $1,800,000 of first mortgage bonds and $750,000 par value of common stock, or a total of $2,550,000. In return the New England Company received the net assets of the Massachusetts Company at a ledger value of $10,000, property valued at $1,700,000 and $100,000 principal amount of Massachusetts Company bonds which were retired. These net assets which the New England Company received for the securities total $1,810,000, representing a difference of $740,000, which is the amount of the write-up previously referred to.



About this time a site on which a power plant had been built was transferred to the New England Power Company of Maine, a subsidiary, for 17,500 shares of common stock of a par value of $1,750,000. These shares were carried on the books of the New England Power Company of Maine at a nominal value of $1. Certain real estate and water rights were transferred to the New England Company and were carried by the New England Power Company of Maine at $295,559. They, however, were recorded on the accounts of the New England Company at $3,901,810.

In about 4½ years the property was transferred to the New England Company. Apparently the undeveloped real estate and water rights were written up $3,606,251 and at the same time the recorded ledger values of certain securities were written down. There was common stock amounting to 15,000 shares of the Connecticut River Power Company of New Hampshire, valued on the ledgers of the merged company at $2,000,000. The ledger value as set up by the New England Company was $1,500,000. The other securities were similarly reduced. The total ledger value of all the issue was $7,720,101. They were set up on the books of the New England Company at a net decrease of $3,580,001. For the 15,000 shares of Connecticut River Power Company of New Hampshire common stock which the Connecticut River Power Company of Maine held the Connecticut River Power of Maine exchanged 20,000 shares of its own common stock at the par value of $2,000,000. The aggregate par value of the securities received was $2,262,500 and the par value of common stock issued was $7,720,000, or a difference of $5,457,500, which was reflected in the ledger values of the securities received as recorded by the Maine company.

The New England Power Association

The next major transaction was the reorganization and expansion of the New England Company into the New England Power Association. The New England Power Association was to receive the assets and assume all the liabilities of the New England Company and an exchange between the stock of the two organizations was made in 1926.

In regard to carrying out financing operations for its subsidiaries the following practices appear:

First, all financing was considered from the system's standpoint; second, construction of new plants, additions and betterments were done by construction companies owned by or allied with the holding company; third, most of the financing, other than short term borrowing from banks, was done through Baker, Ayling & Company, later Baker, Ayling & Young, and now Baker, Young & Company; M. G. Chace & Company or the Bessemer Investment Company.

All financing of the New England Power System was done in such a way as to capitalize as much as possible the discounts incurred and commission paid to brokers in marketing the various securities, as was the policy of the New England Company. The Deerfield Construction Company, for example, absorbed the discount on the first issue of bonds of the newly organized New England Company which were issued by the latter company to the construction company at par in payment for construction work done by the Deerfield Construction Company for account of the Connecticut River Transmission Company. This method of handling discounts was adopted because of the Massachusetts statutory requirements which provided that utility securities which were not subscribed by stockholders or employees could not be issued at less than par or more than 6 per cent interest.

From organization in June, 1914, to 1918 the holding company handled all transactions in system securities with brokers, the method used to market the securities being as follows: (a) The New England Company, the holding company, securities were sold to brokers direct, and (b) securities of subsidiaries which were not subscribed by stockholders or employees were purchased from issuing companies at par and sold to brokers at a discount. The discounts and commissions were charged to so-called construction reserves, which were created by, first, charges to construction work in process; second, charges to Power Construction Company, a subsidiary company, designated as administrative and financing, and, third, excess charges to subsidiary companies.

From 1918 to 1924 the Power Construction Company acted as clearing company for most of the securities of operating companies and some of the holding company securities. The method of acquisition and disposal was practically the same as that followed by the New England Company.

Acquires Retailing Market in 1926

Worcester and Providence properties acquired

Other distributing companies bought.

Hydro and steam sources integrated.

DURING the period, roughly, from 1926 to 1930 the New England Power Association turned its attention to the development of an extensive retail market. A syndicate had organized the Rhode Island Public Service Company to acquire the stock of the Narragansett Electric Lighting Company and United Electric Railways Company.

An offer was made to exchange one share of Rhode Island Public Service Company class A stock for each share of the United Electric Railways stock and cash of $86 per share for the Narragansett stock. The plan also provided that the service company would issue 1,000,000 class B shares and sell them to the syndicate for $6,000,000 cash. It became necessary to modify the $86 per share price of the Narragansett Electric Lighting Company stock. New England Power Association agreed to offer or finance an offer to purchase all the Narragansett Electric Lighting Company stock presented and deposit the same under the plan of the syndicate in consideration for the transfer to the association of the subscription rights of the syndicate to the 1,000,000 shares of class B stock of the Rhode Island Public Service Company. The association also agreed to pay $1,200,000 to the syndicate and to allow each subscriber to take its proportion of the $1,200,000 in cash or association common stock at $50 per share. Each subscriber, in addition, could purchase the association common stock at $60 per share up to an aggregate amount equal to his subscription. The New England Power Association was also to pay bankers a commission of $200,000 and not over $25,000 expenses. Brokers were to receive a commission of $1.50 per share for all preferred shares taken by depositors of United Electric Railways Company and Narragansett Electric Light Company stock.

Providence property important

Acquisition of a part interest in the Rhode Island Public Service Company marks an important step in the evolution of the New England Power Association.

At the time the association became interested, the capitalization of the company consisted of 495,486 no-par preferred shares, valued at $13,625,865; 80,730 shares of no-par class A stock, valued at $4,441,285, and 1,539,342 shares of $6 par class B stock, valued at $9,236,052, or a total capitalization of $27,303,202.

At the end of 1929 the New England Power Association owned 2,690 shares preferred, 70,838 shares of class A and all, or 1,539,342 shares, of class B stock of Rhode Island Public Service Company. The class A stock has equal voting rights with class B and is entitled to receive cumulative dividends at the rate of $4 per share per year before any dividends are paid on class B stock. The class A stockholders are also entitled to $2 per share in any year after dividends at the rate of 75 cents per share have been paid on the class B stock before further dividends are paid on class B in any one year.

In the acquisition of Rhode Island Public Service Company stock 1,000,000 class B shares were subscribed for at organization and acquired for cash at $6 per share in 1927 under the terms of a syndicate agreement; 539,342 shares were purchased in 1929 from the Rhode Island Public Service Company for cash at $6 per share. Expenses in connection wiith this transaction involved payment to the syndicate of $1,200,000, less the association share of $205,333, or a total payment to the syndicate of $994,666. In addition, $1,450,979 was expended by the association in carrying out the syndicate plans. Members of the syndicate included Bodell & Company of Providence, who organized the syndicate in 1926 to acquire the stock of the Narragansett Electric Lighting Company and United Electric Railways Company, also of Providence. The syndicate also included F. L. Carlisle & Company, with a 19.75 per cent interest; Baker, Young & Company, with a 9.6 per cent interest; Stone & Webster, 11.25 per cent interest, and International Securities Company, with a 9.4 per cent interest.

During 1927 and 1928 the association acquired for cash in the open market a minority interest in the common stock of the Worcester Electric Light Company.

Early in 1929 the association, knowing it was competing with outside interests who wished to acquire control of the Worcester company, entered into an agreement with the trustees of the Worcester Electric Light Company voting trust to acquire from them all shares deposited under the stock trust agreement at $226 a share. They later made an alternative offer on the basis of 2-31/97 shares of New England Power Association's preferred $100 par stock for each share of Worcester Electric Light Company stock. In accordance with these offers the association acquired the balance of the outstanding shares. More than 38,000 shares were bought for cash at $226 and 31,703 shares were acquired for 73,538 shares of association $100 par preferred stock. The total cost of the 96,000 shares to the association was thus $21,465,582.

On the records of the Worcester Electric Light Company the book value of this stock was $6,778,572. The value of the Worcester company plant and property on the books of the company at the date of the taking over of the majority of the stock was $7,687,095. In a rate case going on near that time the company claimed a valuation of $17,837,965, while the Massachusetts Department of Public Utilities placed the value of $10,000,000 on the property. The case went into the courts and a special master was appointed. He found the valuation to be $15,285,164. An appraisal made by Stone & Webster in July, 1927, showed a valuation of $17,526,360. When the New England Power Association acquired control of the company the rate case against the Department of Public Utilities was dropped and the rate established previously by order of the department was put into effect.

Control of the Massachusetts Utilities Associates was acquired in 1930 through purchase from C. D. Parker & Company of 125,000 voting trust certificates.

Prior to this time the association owned 226,335 voting trust certificates or 12.81 per cent. When it acquired control the association owned 381,972 certificates, or 16.3 per cent. This was in October, 1930.

The Massachusetts Utilities Associates through its subsidiaries served electricity and gas to 117 cities and towns in Massachusetts. At the end of 1929 it owned 26,372 shares of the capital stock of the Edison Electric Illuminating Company of Boston. It appears to have been the largest single shareholder in that company. The Massachusetts Utilities Associates also owned 80.3 per cent of the Massachusetts Lighting Company and other subsidiaries.

There were 25,000 shares of New England Power Association common stock issued to F. D. Comerford, president, at $50 per share. These were issued in accordance with an option to Mr. Comerford by the board of directors in 1927. The rights have not yet been exercised, but Mr. Comerford may exercise them at any time. Dividends have been paid, but the amount of interest is charged on the stock outstanding amounting to the same as the dividends.

There were 19,247 shares of common stock issued to stockholders of Connecticut Valley Company at $85 per share for 10,000 shares of Connecticut Valley preferred, 38,495 shares at $90 per share for 20,000 shares of Connecticut Valley preferred, 2,823 shares issued to International Paper & Power Company at $85 per share for 4,800 shares of International Hydro-Electric System class A stock issued in acquiring the Tiverton Electric Light Company. The largest single shareholder is the International Hydro-Electric System.

Outside Interests Enter and Retire

Northeastern Power and Stone & Webster participate with International Paper in 1926.

Control since 1928 exclusively with International Paper interests.

THE groundwork for the final expansion of the New England System was laid in 1925, when a plan of expansion was undertaken. The parties to the agreement made at that time were the New England Company, F. L. Carlisle & Company, International Securities Company and Stone & Webster, Inc. International Securities Company was affiliated with the International Paper Company and acted for it in this transaction. F. L. Carlisle & Company were connected with the Northeastern Power Corporation and the St. Regis Paper Company and also the Power Corporation of New York. They had not figured in the affairs of the New England Company up to this time, nor had Stone & Webster, Inc.

At that time the New England Company had outstanding 34,185 shares of first preferred stock, 27,200 second preferred and 101,341 of common stock. The shareholders were to receive after the reorganization 237,532 shares preferred and 120,381 shares of common stock of the new association. Then 400,000 additional common shares were to be issued for cash at $50 per share. Of this 173,333 were to go to F. L. Carlisle & Company, 86,667 to International Securities Company and 140,000 to Stone & Webster, Inc. The new association was to sell to International Securities Company or its nominee the stock of Bellows Falls Canal Company and all mill powers and rights owned by it necessary or useful for the hydro-electric development on the Connecticut River at Bellows Falls. The price was to be the actual cost in cash plus operating and carrying charges figured with simple interest at 6 per cent. The control of the new association was divided thus: F. L. Carlisle & Company, 33.3 per cent; Stone & Webster, Inc., 27 per cent; International Paper interest, 25.8 per cent; New England Company, the old New England Company stockholders, 13.9 per cent. It is interesting to note that the reason the old owners were willing to relinquish control was their need to secure funds for further necessary developments and to have available the experience and resources of the new interests.

Stages of reorganization

In this reorganization the shareholders of the New England Company agreed to deposit their stock and accept for each share of first preferred stock of New England Company 1.1 shares of new 6 per cent preferred stock of New England Power Association; for each share of first preferred stock of the New England Company, with dividend rights attached, 1⅛ shares of new 6 per cent preferred of the New England Power Association; for each participating second preferred share of New England Company, $115.60 of the new 6 per cent preferred and 7.10 of a share of common stock of the New England Power Association; for each share of common of the New England Company $165 of the new 6 per cent preferred and one share of the new common of the New England Power Association. The stated value of the association stock issued to carry out the exchange was $29,772,265, while the stated value of the New England Company stock outstanding was $14,315,675. The book value of the New England Company stock was $16,177,974 according to its own books, which involves an increase in stated value and book value of $15,456,590 and $13,594,290 respectively. This increase was disposed of by writing up the value of the assets required from the New England Company. There was a total write-up of $17,412,290, of which $15,456,590 was to take care of the increased stated value of the stock issued. The investment in common stocks of operating companies constituted the bulk of the write-up. Prior to the reorganization, the New England Company was carrying these investments in operating companies on its books at approximately $2,000,000 more than the amount at which they were shown on the operating company books.

The final acquisition of control by the International Paper & Power Company apparently was facilitated by the presence of the Phipps interests in the picture.

These interests had extensive holdings in the International Paper & Power Company and they also had a large interest in the New England Power Association. Prior to the formation of the International Paper & Power Company in November, 1928, the International Paper Company was the top holding company in the group. Through a rearrangement and exchange of stock at that time the International Paper Company became a direct subsidiary of the International Paper & Power Company. At the end of 1929 the International Paper & Power Company held directly control of two important subsidiary companies, the International Paper Company and the International Hydro-Electric System.

The International Hydro-Electric System was a holding company which controlled two large public utility groups, the Canadian Hydro-Electric Corporation, Ltd., operating in Canada, and the New England Power Association group, operating in New England. The International Securities Company was a subsidiary of the International Paper Company. The largest stockholder in the International Paper & Power Company was the Henry C. Phipps interest, which controlled directly or indirectly 14.5 per cent of the voting stock. Cyrus S. Eaton and affiliated interests controlled directly or indirectly about 12.5 per cent of the voting stock. The International Paper & Power Company indirectly owned or controlled, through an affiliated company, the International Securities Company, 11.6 per cent of its own voting stock. The fourth largest block of stock was in the hands of A. R. Graustein, president of the company, who owned or could secure the support of 8 per cent of the voting stock. The Chase National Bank, Harris-Forbes group, controlled 2.4 per cent of the voting stock and participated in practically all financing of the company.

As already intimated, the International Securities Company entered into an agreement in November, 1925, with the New England Company, F. L. Carlisle & Company, Inc., and Stone & Webster, Inc., for the enlargement and reorganization of the New England Company.

Between January, 1926, and March, 1929, International Securities Company acquired 361,614 shares of common stock of the New England Power Association, of which 358,214 shares were sold to the International Paper Company in 1926 and 1927 and 3,400 shares were sold to the International Hydro-Electric System. The sale price of the total appears to have been $1,594,597 in excess of the purchase price of the shares.

The International Securities Company entered into an agreement in March, 1929, with a banking group including Chase Securities Corporation, Bankers Trust Company of New York and Harris-Forbes Company establishing a trading account in the class A shares of International Hydro-Electric System. International Paper & Power Company, as already indicated, controlled International Hydro-Electric System by ownership directly or indirectly of more than 95 per cent of the voting stock. International Hydro-Electric System controlled 87.55 per cent of the common stock of the New England Power Association, thus controlling that company. These are the figures as of June 30, 1930.

Regional Service Advanced by Power Association*

By F. D. COMERFORD
President New England Power Association

THE New England Power Association is an enterprise serving the public, in which more than 50,000 individuals, charitable institutions, insurance companies and savings banks are participants through the ownership of more than $270,000,000 in securities. Most of these individuals reside and these institutions are located in the territory which we serve. The association furnishes employment, at good wages, to more than 8,000 skilled men and women. It pays more than $4,000,000 annually in taxes. It supplies light and power to the homes and the factories of nearly 600,000 customers in 300 cities and towns with an aggregate population of 3,000,000. The average revenue per kilowatt-hour delivered on the entire system was 2.16 cents for the calendar year 1929, which compares very favorably with a reported average of 2.64 cents for the entire country.

Necessarily, our corporate structure is somewhat complicated. We generate our power in four states. We distribute it through large areas in these states and in a small section of a fifth. These states have varying laws and regulations, with which we comply, and the net result is that we have many operating companies which can only be unified through a holding company. The duplications mean extra expense, which in the last analysis must be borne by the consumer. Perhaps the time will come when we can obtain a more efficient unification than now prevails.

Benefits accrue from the consolidation

Many advantages are secured by the efficient interconnection which we have established. Perhaps the most important feature of that interconnection is the protection of service. A small company, operating by itself, very often is in serious difficulties in the face of an accident to a generator, or the effect of a violent storm on its lines. In our large system we are able to meet the most serious of natural calamities with a minimum of service interruption and inconvenience to the homes or factories dependent on our power.

The economies in operation are almost without number. The large system is able to maintain mobile and highly trained engineering, construction, maintenance and operation forces. It can command the services of experts in financial, accounting and insurance matters, in legal affairs, in the advertising of the system or the merchandise which it sells. It can effect great savings in bulk purchases and transmit these savings to the smallest units. And the large system can obtain the kind of expert supervision beyond the reach of the small companies.

The association was formed in 1926. Only one or two of the smaller retail companies were then part of our system. The large retail distributing companies in the larger cities entered the system later. I will refer to the ratio of operating expenses to operating revenue of the fourteen electric companies under our direct management in 1929 and the comparative figures for 1926, when most of them were independently managed.

> **In those three years this operating ratio, excluding taxes and depreciation, was reduced from 53.5 per cent of operating revenue to 48.2 per cent. In that same period the average revenue per kilowatt-hour received by these same fourteen companies had been reduced from 3.11 cents to 2.55 cents, or 18 per cent reduction.**

In New England electricity can be developed most economically by a combination of water power and tidewater steam power—the water power to carry the peak loads and the steam stations to carry the base loads. Complete integration—that is, making scattered electric generating units into one system—enables the use of the most economical source of power.

While the electric industry developed very early in New England, unlike most of the country, up to recently the industry consisted largely of independent electric companies in each town, with their own independent plants and rarely interconnected. The success of the larger units in the rest of the country made it clear to New England that the public was not getting the same service as in the areas where the larger units had developed.

Why was a holding company used to accomplish these purposes? Because the water powers were located largely in Vermont and New Hampshire. The tidewater steam stations are in Rhode Island and Massachusetts and the bulk of the load in Rhode Island and Massachusetts. To organize a system it was necessary to have a company controlling the properties in all four states. A corporation organized under the laws of any one of the states could not operate in all the others.

The laws of Massachusetts have always been rigid with respect to electric companies. One of the laws provides that a domestic corporation cannot own more than 10 per cent of the stock of a Massachusetts electric company and another makes it impossible for a foreign corporation to own a majority of the stock of a Massa-

**Excerpts from statement made at hearing of Federal Trade Commission in investigation of utilities.*

chusetts electric company. Because of this it was impossible to have the holding company a corporation, and for that reason it is a voluntary association.

Power from lowest cost sources

The system has operated to obtain the power from the lowest cost source. Flood water on the rivers on which the hydro plants are constructed is turned into power and used to replace coal. The Fifteen-Mile Falls plant alone is generating at the rate of 400,000,000 kw.-hr a year, which means a saving of more than 250,000 tons of coal each year. Complete interconnection between parts of the system makes it possible to use the most efficient generating unit in the system. Interconnection with outside companies, such as the New York Power & Light Company, Turners Falls Company and the Boston Edison Company, permits the interchange of power freely as emergencies require.

As I have pointed out, unified operation is essential. This unified operation necessitates the holding companies making charges against the operating companies; to be reimbursed for the services of the employees of the system. Up to 1929 we had no service contracts, but billed the cost of such service to the operating companies. This method was unsatisfactory because of the difficulty of properly allocating the charges. We have endeavored to set up a service contract arrangement, which is terminable at any time by the operating company. This arrangement is not designed to make a substantial profit for the holding company. In 1929 and 1930 the service contracts will show a profit to the holding company. In 1931 the prospect is that the service contracts will show a loss to the holding company. This is largely because construction activity has diminished without the fixed costs being reduced to the same extent.

Two transactions in the examiner's report are called "write-ups." This seems to me particularly misleading.

The first transaction is in connection with the formation of New England Power Association. From the beginning of the system in 1907 down to the formation of the association there were purchased, from time to time, hundreds of parcels of land bordering on the rivers. These lands were purchased largely as farm lands. They were gradually put together, dams and power houses built on the rivers, much of the land flooded, and transmission lines constructed long distances to market. From thousands of parcels of farm land located on the rivers and elsewhere, a power system emerged. In 1926, years after the first of these purchases, a new group purchased the system for a sum in excess of the original cost of the properties. The purchaser must, of course, carry his purchases on his books at cost. It would be interesting to compare the assessed valuation of these lands now as compared with when they were purchased.

If the proper rule is that a purchaser of a utility property, or a share of stock in a utility property, cannot carry what he has bought on his books at a price higher than what that property or share of stock cost to the person from whom he bought it, then you mean that no utility property or share of stock in a utility property can be permitted to appreciate one dollar above its original par value. Such a theory, of course, is held nowhere.

Utility properties, or stocks in utility properties, vary above or below their original cost, depending on a great many different factors which cannot be controlled. There can be no "write-up" in the true sense of the word where there is a bona fide sale.

The second transaction above mentioned is in connection with an acquisition of the Rhode Island Companies:

The United Electric Railway negotiated a plan with certain business interests in the state under which these interests would acquire for cash the stock of the Narragansett Electric Lighting Company and would put that stock and the stock of the United Electric Railways Company in a new company. This new company was called the Rhode Island Public Service Company. It exchanged its securities for the United Electric Railways stock and acquired the Narragansett Electric Lighting stock.

The amount of these securities which could be issued was approved by the Rhode Island Public Utilities Commission, after public hearings at which all parties interested were represented. There were in evidence before the commission complete detailed appraisals. The commission authorized the issue of bonds and stock of the United Electric Power Company in payment for such property. The amount of the securities issued was not in excess of the fair present-day value of the property acquired by the United Electric Power Company.

The aggregate amount of these securities represented the consideration paid by the United Electric Power Company for the properties. To say that the difference between the book value on the books of the Narragansett Electric Lighting Company and the book value of such property on the books of the new company represented a "write-up" seems to me misleading. The values on the books of the old company did not represent present-day values, but in many cases represented values of twenty or thirty years prior. A purchaser, of course, had to carry the properties on his books at the cost to him. Otherwise, no share of stock in a utility company can ever have a market value in excess of its original book value. No court has ever held such a theory.

Book records give inadequate picture

Mere bookkeeping entries cannot tell the story of the trials of the men who labored for the success of the companies. We recognize the difficult task of examiners in fairly and accurately analyzing transactions occurring many years ago, in a territory and under laws and conditions with which they are not familiar. But the reports should reflect some of the background of these transactions, without which no fair study of any transaction can be made. Nowhere in the report appears the statement that the enterprise was highly speculative, difficult to finance and certainly could not have progressed without the usual financial methods required by such enterprises.

The commission has not considered the value of the property or any part of it, and it has no means of determining this. The originators of the company have been well compensated for their services, but if it had not been successful, they would have lost all they had.

Unless such pioneering can be made attractive, there will be no pioneering done.

All this background has been recognized by the local regulatory bodies who know the facts as facts and not merely as bookkeeping entries.

Centralized Supervision Supplements Local Autonomy*

By J. C. DICKERMAN

Economic Division, Federal Trade Commission

Vice-presidents perform departmental functions.

Local operating executive still in charge.

Area suffers from obsolete local facilities.

THE New England Power Association has developed a staff which in effect has brought about a unified organization and operation of the many properties which it controls in the New England States, exclusive of the State of Maine. Vice-presidents of the New England Power Association and other responsible officers have active direction of the policies and activities of the subsidiaries in the matters, among others, of generating power, the transmission system with its principal substations, accounting, purchasing, insurance, including employees' insurance, statistics, engineering and construction, payment of interest on bonds and dividends, sale of new securities, rights-of-way, and taxes. For some years much of this service, aside from direct engineering design and construction supervision, was done without contracts, the cost being prorated to the several companies. A later system has been to contract with the companies for an over-all annual fixed management fee based on the estimated service required, but not on any specific arrangement of percentage of revenues or expenses. Certain services, such as the system dispatchers' head office at Millbury, are carried on the payroll of the New England Power Company, the principal wholesale power operating subsidiary, but an allocated charge therefor is made to other companies in proportion to the assumed benefits.

Beginning with January 1, 1931, a new organization, the New England Power Engineering & Service Corporation, a wholly owned subsidiary of the association, took over management contracts with the companies of the Massachusetts Utilities Associates, in which the New England Power Association had only minority interests. This new corporation also contracts to service the Massachusetts Utilities Associates as a corporation, and it is the intention to transfer such service contracts as exist between the New England Power Association and its wholly controlled subsidiaries to this new service corporation and rearrange staff relationships accordingly.

Supervisory management services are to be given for an agreed lump sum to be paid monthly. Certain services are to be paid for on an expense and double salary basis, while engineering and construction undertaken in full by the new corporation is on a basis of all costs, including salaries of field representatives of the corporation on the job plus a fee of 8 per cent. This is specified to include the services in the Boston office of executives, purchasing agent, accounting department and miscellaneous Boston expenses.

Aftermath of early local developments

The most striking feature of the whole situation disclosed by this study of the present New England Power Association is that during the period of 1907 to 1920, when the predecessors of the association were building their series of hydro-electric plants, long-distance transmission lines and interconnections with other large producers, all headed toward the principle of producing power in large amounts at the cheapest sources and distributing to the center of use, literally scores of independent electric companies easily within distances to justify looking for their sources of power to a large producing gathering and transmitting system, were putting up well-built, individual power plants with such single units as 1,000, 1,500 and 2,500-kw. turbines operating with steam at 150 or almost 200 lb. pressure to meet loads of a few thousand kilowatts.

Today the electric industry and its consumers in New England are burdened with a lot of generating stations, a credit to their designers and builders from a structural standpoint, but now a source of excessive operating cost compared to what a centralized source operating could do in producing the required energy. The small properties are not worn out, but are nearly valueless from obsolescence. These individual properties had to have ample reserve capacity. Some seem to have from 50 to nearly 100 per cent reserve—another source of excessive cost. State laws, individualism of the owners or managers of these long-existing prosperous businesses and a lack of confidence in the reliability of transmission line service were major causes of this lack of co-operative planning or financial unification.

**Excerpts from testimony of Mr. Dickerman at Federal Trade Commission hearing on March 21, 1931.*

Financial and Statistical News

ONE significant factor in the week's rather dull market was the tendency of bonds to show increasing strength, particularly in the tax-exempt and utility issues. Any material appreciation in these prices will undoubtedly bring in a volume of financing, especially as high-interest-bearing utility bonds could then be refunded for lower coupon issues. The process is further facilitated by the callable feature of many issues sold in the last three years.

——ALTHOUGH PUBLIC UTILITY FINANCING HAS FAR EXCEEDED that of any other group this year to date—more than $589,314,000 in the power and light industry alone—there is still a fairly large volume awaiting better market conditions.

——UTILITY COMMON STOCKS HAVE HELD THEIR GROUND at about the levels of a week ago, the average of 37 stocks being 64.3, against 64 a week ago and 70 a month ago.

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Consolidated Gas Elects Two Bankers Trustees

ANNOUNCEMENT HAS BEEN MADE that George Whitney, a partner in J. P. Morgan & Company, and Charles E. Mitchell, chairman of the board of directors of the National City Bank, were elected trustees of the Consolidated Gas Company of New York, to succeed Samuel Sloan, resigned, and the late Walter R. Addicks. The National City Bank has acted as banker for the Consolidated Gas Company for many years.

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Public Utilities Maintain Dividends

CUTTING DOWN OF DIVIDEND PAYMENTS continued in April, but on a reduced scale as compared with March. The total amount paid by 1,040 corporations amounted to $277,913,939, as compared with $370,245,485 for 1,940 corporation payments in March and $293,127,842 for 622 corporations in April, 1930. An exact comparison is impossible because of the difference in the number of corporations making payments in each month, but by comparing the amounts paid in rates with the number of corporations making such payments the extent of the decline in disbursements, compared with 1930, is indicated.

A compilation of dividends declared in April, as compiled by the New York *Times*, were classified as shown in the accompanying table.

It is interesting to note that though numerous payments were reduced and omitted, the public utilities in most instances continued last year's rates.

Class	1931	1930
Banks and insurance	$15,458,150	$9,959,394
Chain stores	10,884,423	12,783,924
Coppers	5,319,626	9,988,570
Department stores	1,455,161	2,573,948
Food and packing	11,901,710	14,814,679
Mail order	358,750	3,684,410
Motors	6,404,111	8,282,026
Motor equipment	1,010,416	2,339,072
Oils	15,688,789	14,654,345
Public utilities	58,076,026	63,350,709
Railroads	34,650,756	37,162,996
Railroad equipment	4,126,710	3,938,996
Steels	29,444,832	33,313,458
Tobaccos	10,713,435	4,218,155
Miscellaneous	72,421,044	72,063,160
Total	$277,913,939	$293,127,842
Number of corp'ns	1,040	622

New Capital Issues

AN ADDITIONAL ISSUE of first mortgage and first lien 25-year 5 per cent gold bonds, series B, of the Eastern Shore Public Service Company to the amount of $1,250,000 was offered during the first week of May. These securities were priced at 92 and accrued interest, to yield more than 5.60 per cent. The Eastern Shore Public Service Company owns and operates electric public utility properties in Delaware. Proceeds from the sale of the bonds will be used to reimburse the company for part of the cost of acquiring additional properties in Delaware, for the acquisition of bonds of affiliated company and for other corporate purposes.

New Jersey Power & Light Company made an offering of first mortgage gold bonds, 4½ per cent series, due 1960, at 102 and interest, yielding more than 4⅜ per cent, a piece of financing involving a total of $6,000,000. The company will use the proceeds to retire on or before August 1 all of its 5 per cent bonds now outstanding, to reimburse its treasury for improvements to property and for other corporate purposes.

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Ontario Hydro Power Rates Attacked as Excessive

TANGIBLE evidence of the Ontario Hydro-Electric Power Commission's policy of charging high rates to industry and large users in order, presumably, to furnish current to domestic consumers at low rates is provided in the complaint recently made by the Toronto Transportation Commission. In its annual report the latter protests that it is charged excessive rates for power; higher rates, in fact, than pertain under private enterprise in most American cities. Chairman L. Hubbard states that the traction system is being overcharged by about $400,000 a year. According to the power commission act, the Hydro-Electric Commission must furnish power to the Transportation Commission at cost and these costs are supposed to be annually reviewed and adjusted if necessary. In the case of direct-current power purchased from the Toronto Hydro-Electric System, it is said that no cost adjustments have ever been made since the Transportation Commission started operations in 1921. As a matter of fact, it is stated that the direct-current power rates are still exactly the same as the rates established for the Civic Lines in 1912. The Transportation Commission also complains that "no information as to the basis on which costs are computed has ever been furnished by the Hydro-Electric Power Commission."

The Transportation Commission purchases part of its power as alternating current from the Hydro-Electric Power Commission and converts it to direct current in its own substations. This power, 70,781,648 kw.-hr., which represents about two-thirds of requirements, works out to an average cost of 1.298 cents per direct current kilowatt-hour, after conversion with rotary converters and including all operating and maintenance costs and fixed charges on the investment.

The Transportation Commission purchases this power, supposedly at cost, from the 13,000-volt switchboard of one of the terminal stations of the Hydro-Electric Power Commission in Toronto, power coming in to the terminal from the 110,000-volt transmission lines of the Hydro-Electric Commission bring-

ing power from Niagara Falls or the Gatineau Power Company. From the 13,000-volt bus in the terminal station it is transmitted over Transportation Commission cables to four substations. The commission pays on the monthly maximum coincident peak of the four substations measured at the 13,000-volt bus at the terminal station, computed in horsepower. The rate for the year 1929 was $24.22 per horsepower-year, or about $2.02 each month times the monthly coincident peak in horsepower.

The rate varies each year, but for the last few years has fluctuated between $24 and $26 per horsepower-year. The 1929 cost represents 0.85 cent per alternating-current kilowatt-hour at the 13,000-volt bus at the terminal station. The Transportation Commission considers this rate is much above cost, although it states it is not so badly out of line as the rate which it pays for delivered direct current from the local substations of the Toronto Hydro-Electric System.

In supporting its claim of excessive rates the Transportation Commission cites the cost of power in cities where conditions are somewhat comparable, and the following tabulation in cents per kilowatt-hour is presented.

	Cents
Chicago Surface Lines (steam plants)	0.9857
Seattle Municipal Railway (hydro plants)	1.000
Boston Elevated Railway (steam plants)	0.921
Milwaukee Electric Railway & Light Company (steam plants)	0.985
Capital Traction Company, Washington, D. C. (steam plants)	0.9449
International Railway Company, Buffalo, N. Y. (steam and hydro plants)	0.8657
New York State Railways, Rochester, N. Y. (steam plants)	0.800
Toronto Transportation Commission (hydro plants)	1.514

"It is submitted," the report continues, "that the foregoing comparisons justify the belief that the rates charged the Transportation Commission do not represent actual cost, and are, apparently, at least 50 per cent higher than are paid usually by other railway companies; that is, the annual bills for power purchased should be reduced some $400,000 per year."

Ontario Hydro takes issue with Toronto Commission

Serious objection was taken to the complaints of the Transportation Commission by the Ontario Hydro-Electric Commission at its annual meeting. A statement was made regretting that the commission, "especially at this time, should make such misleading and erroneous statements in regard to the cost of the power, when it is fully advised that the Hydro-Electric Commission, at the Transportation Commission's request, is making a full review of the analysis of the cost of the power as supplied through the Toronto Hydro-Electric System."

The statement went on to say: "It is not in the public interest of the municipality of Toronto, nor in the interests of both systems, nor in the interests of all co-operating municipalities, to have such statements made without a full representation of all the essential facts relating to the matters involved."

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March Output Shows Improvement

MARCH ENERGY OUTPUT of public utility plants, including those for railway and other service as well as electric light and power, was 7,860,141,000 kw.-hr., it is reported by the United States Geological Survey. Although this is 4 per cent less than in the same month of 1930, the decrease compared with the preceding year has been shrinking; beginning with September the monthly percentages have been successively 3, 6, 7, 5, 8, 6, 4.

A comparison with the early part of 1929, to skip over the abnormalities of 1930, shows March down but 2 per cent, while the first two months were down nearly 4 per cent. This seems to indicate a real improvement. Water power furnished 32 per cent of the output in March, against 29.6 per cent in January and 30 per cent in February.

Regionally there has been an improvement in output, compared with 1930, particularly in the industrial sections, as follows:

Geographical Region	Per Cent Over 1930 February	March
New England	—1	+2
Middle Atlantic	—3	—1
East North Central	[illegible]	[illegible]
Pacific	—3	+3

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New England System Assets Up 10.5 per Cent

DESPITE highly unsatisfactory business conditions, gross earnings of the New England Power Association for 1930 were $41,220,785, against $40,408,008 in 1929, an increase of 2.01 per cent. Total assets showed an advance of 10.50 per cent during the same period, from $297,138,731 to $328,332,276. This was in the face of a 6.5 per cent decline in power production, due chiefly to reduced operations in the textile industry.

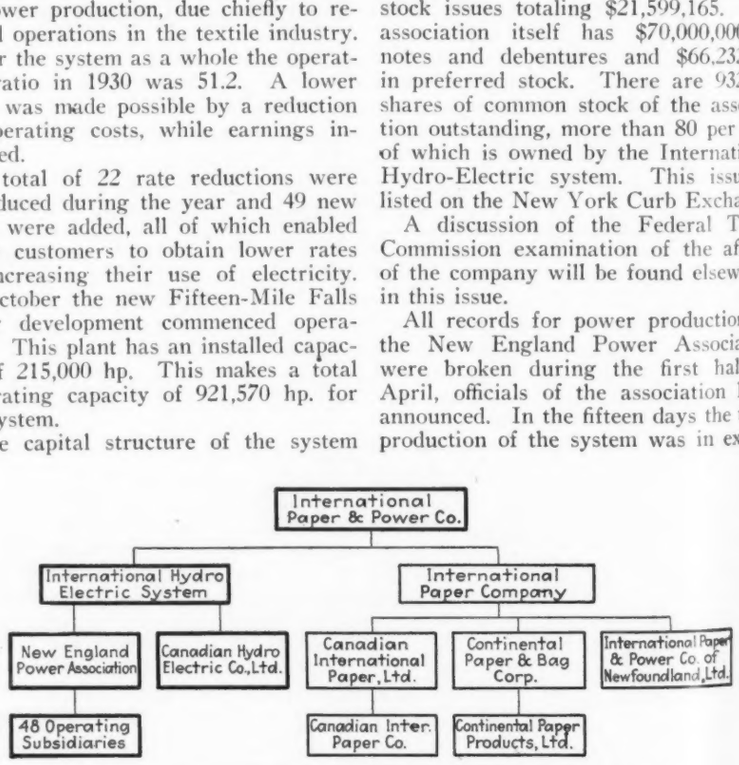
For the system as a whole the operating ratio in 1930 was 51.2. A lower ratio was made possible by a reduction in operating costs, while earnings increased.

A total of 22 rate reductions were introduced during the year and 49 new rates were added, all of which enabled many customers to obtain lower rates by increasing their use of electricity. In October the new Fifteen-Mile Falls lower development commenced operation. This plant has an installed capacity of 215,000 hp. This makes a total generating capacity of 921,570 hp. for the system.

The capital structure of the system has been considerably simplied in recent years. Taking over responsibility for the operations of the Massachusetts Utilities Associates involved the addition of more than 40 operating companies. The funded debt of subsidiary companies involves some fifteen bond issues, totaling $55,235,645, and subsidiaries have five preferred and class A stock issues totaling $21,599,165. The association itself has $70,000,000 in notes and debentures and $66,232,040 in preferred stock. There are 932,281 shares of common stock of the association outstanding, more than 80 per cent of which is owned by the International Hydro-Electric system. This issue is listed on the New York Curb Exchange.

A discussion of the Federal Trade Commission examination of the affairs of the company will be found elsewhere in this issue.

All records for power production by the New England Power Association were broken during the first half of April, officials of the association have announced. In the fifteen days the total production of the system was in excess


International Paper & Power Co.
International Hydro Electric System
International Paper Company
New England Power Association
Canadian Hydro Electric Co.,Ltd.
Canadian International Paper, Ltd.
Continental Paper & Bag Corp.
International Paper & Power Co. of Newfoundland, Ltd.
48 Operating Subsidiaries
Canadian Inter. Paper Co.
Continental Paper Products, Ltd.

Capital structure of the New England Power Association

of 86,000,000 kw.-hr., a substantial increase over any other period of fifteen consecutive days in the history of the system. The 24-hour record of 6,122,360 kw.-hr., established on December 16, 1930, was exceeded on seven days, with 7,093,716 kw.-hr. on April 14.

While there has not been any sharp upward turn in the general business curve, improvement is noted in some industries, notably in textiles, which in March used 20 per cent more power than in the same month last year, and in the rubber industry, which showed a 12 per cent increase in consumption from the lines of the association.

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Commission May Extend Control of New Financing

FURTHER control of the issue of new utility securities may be undertaken by the New York State Public Service Commission. Utilities are to be ordered to show cause why unexercised authority to issue securities should not be rescinded by the commission.

Public hearings have been arranged before the commission in New York City May 18, Buffalo May 20 and Albany May 25. The utilities will be required to file a statement setting forth the amount of securities authorized but not issued. At a recent date, according to the Public Service Commission, there were nearly 200 of these authorizations passed by the commission and its predecessors, in which the full amount of securities authorized had not been issued. These total about $361,000,000, of which $181,000,000, or 50 per cent, remains unissued. In three instances these unexercised authorizations go back over twenty years.

"There are two things which make this condition very significant," said Chairman Milo R. Maltbie. "The first is that before authority to issue securities may be granted the commission must find that the issue is 'necessary' for certain specific purposes named in the statute. Of course, the commission must decide whether an issue is necessary upon the facts in the case and particularly upon statements or testimony made by officials of the company concerned. Even assuming that the finding that the issue was necessary was justified by the facts at the time of action by the commission, how can it be said that an issue is necessary when it was not utilized to the extent claimed for five, ten or twenty years? This suggests the question whether, if authority to issue securities is not utilized within a reasonable time, the authority ought not to be canceled or rescinded?

"The second important point is that it has been the practice of all commissions since 1907 to attach conditions to the authorizations granted. These relate to the purpose for which the funds are to be used and particularly the terms upon which the securities may be sold. Thus an order may properly provide, under certain conditions, that 6 per cent preferred stock may be issued at par, that 4½ per cent bonds may be sold at not less than 95 and that 5½ per cent debentures may be sold at not less than par. But conditions change, and under new circumstances the old terms become meaningless."

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Utility Growth Demands Continued High Credit

THE AVERAGE ELECTRIC light and power company over the next twenty years will require an additional permanent investment, to finance normal expansion of business, equivalent to several times its present investment in fixed property, according to a review just issued by John Nickerson & Company, Inc., entitled "The Next Twenty Years in Electric Utility Financing." The review continues:

In all recent public discussions for closer government regulation and lower rates the fact has been overlooked that the continued growth of the utility industry is one of the major factors to our national well being, and to finance such growth economically is largely dependent upon preservation of the present public confidence in the industry and its management.

For many years the average electric light and power company has been increasing its gross sales at the rate of approximately 9 per cent annually. Each dollar of such increased gross revenue requires from $5 to $6 of additional permanent investment by the utility company in fixed property, such as transmission lines, generating facilities and distributing systems. This average growth factor has been sustained over a period of years and should continue with the growth in population and in wider application of electric current.

Assuming this growth rate over the next twenty years, a hypothetical company with $20,000,000 of present gross and $100,000,000 of invested capital would require an additional permanent investment amounting to $460,000,000 and would have outstanding in 1950 more than five times its 1930 investment of fixed capital. If this required financing is applied to all electric utility companies of the country, which at present have about $11,000,000,000 of capital investment, the gigantic size of the problem is readily appreciated.

There has never been an industry that required constant financing on a scale such as the electric light and power business. This emphasizes the importance to the industry and to every individual company in retaining the confidence of investors. To finance economically the normal growth of electric light and power properties is one of the most important problems facing utility operators.

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Refrigerators and Ranges Lead in Revenue

THE NUMBER, USE OF ENERGY and annual revenue of the larger domestic electric appliances during 1930 are given in the accompanying table. The thirteen appliances listed showed an increase in electric consumption of more than a billion kilowatt-hours, or 23.5 per cent, over the figures for the year 1929, although the steady decrease in rates resulted in an increase of only 18 per cent in the revenues which their larger use produced. The estimates were made by the statistical research department of the National Electric Light Association.

Estimate of Energy Used by Domestic Electric Appliances—1930

Appliance	1 Probable Number in Regular Service Average of 1930	2 Estimated Use of Current Kw.-Hr. per Year per Appliance	3 Total Kw.-Hr. Consumed in 1930	4 National Average Cost of Current per Kw.-Hr. (Cents)	5 Total Annual Revenue 1930 (Dollars)
Refrigerators	1,800,000	600	1,080,000,000	4.5	48,600,000
Electric ranges	855,000	2,000	1,710,000,000	2.5	42,750,000
Flat-irons	13,500,000	50	675,000,000	6.1	41,175,000
Radio sets	5,600,000	90	504,000,000	6.1	30,744,000
Vacuum cleaners	6,350,000	36	228,600,000	6.1	13,945,000
Toasters	3,100,000	50	155,000,000	6.1	9,455,000
Water heaters	155,000	3,000	465,000,000	2.0	9,300,000
Percolators	2,400,000	50	120,000,000	6.1	7,320,000
Washing machines	4,600,000	24	110,400,000	6.1	6,735,000
Fans	3,925,000	24	94,200,000	6.1	5,740,000
Oil burners	515,000	240	123,600,000	4.5	5,562,000
Ironing machines	492,000	125	61,500,000	6.1	3,752,000
Space heaters	1,325,000	40	53,000,000	6.1	3,233,000
Total			5,380,300,000		228,311,000
All other appliances plus lighting			5,696,700,000		440,189,000
Total sales, 1930, domestic service (preliminary estimate)			11,077,000,000		668,500,000

NOTES: Column 1: This is an estimated figure for the average number in actual regular service throughout the year; not the total to be found in homes on December 31. It is lower than the latter, because of allowances made for duplicate, unused and damaged appliances in various homes, for houses unoccupied, etc.

Column 4: The 6.1 cents is approximately the average rate paid for all domestic service in 1930; other figures are estimates of the national average based upon the average reduction in rates for use of the quantity shown in column 2.

Business News and Markets

Equipment Companies Approve Merger

STOCKHOLDERS OF BOTH COMPANIES have approved the merger of the International Derrick & Equipment Company, Columbus, Ohio, and the Stacy Engineering Company, Cincinnati. The new company will be known as the International-Stacy Company and will have assets of $11,000,000. Columbus will be headquarters of the new company with the offices eventually located in the building of the International Derrick & Equipment Company.

Harry M. Runkle, president of the International Derrick & Equipment Company, will be president and general manager of the new company, while Carmi A. Thompson, president of the Stacy Company, will be chairman of the board of directors. Mr. Runkle is a director of the American Rolling Mill Company, president of the Eastern Hocking Coal Company and secretary and treasurer of the Batelle Memorial Institute, a nationally known metallurgical institution. Mr. Thompson was secretary to the late President Taft. He was also a former treasurer of the United States.

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Pocket Manual of "Megger" Practice

THE THIRD EDITION, No. 1150, of its Manual of "Megger" Practice has just been issued by the James G. Biddle Company of Philadelphia, enlarged and up to date. It has been the company's aim to make the book comprehensive as far as the testing of insulation resistance is concerned.

The manual includes valuable data on the characteristics of insulation as the practical man meets it in the care and maintenance of electrical equipment. It suggests how and where to look for insulation defects and gives full directions for using "Megger" instruments for detecting, locating and forestalling trouble in practically all types of electrical equipment. There are 96 pages and 67 illustrations.

Changes from previous editions are by no means radical, but the new book does include considerably more on why and when to make "Megger" tests, based on everyday practice in using "Megger" instruments. There are new sections on testing bushings and electrical equipment on shipboard. Testing insulation resistance of telephone and telegraph cable has been revised. The theory and use of the "Megger" guard system for eliminating the effects of surface leakage on equipment under test have been given careful attention. Also, full directions are included for using the new "Bridge-Meg" and Varley loop "Bridge-Meg" resistance testers.

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Vacuum Cleaner Sales

VACUUM CLEANER SALES for the last six months of 1930 are shown in the following table, according to figures compiled by the Vacuum Cleaner Manufacturers' Association:

July	52,225	October	73,934
August	65,164	November	78,626
September	79,185	December	78,611

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Ford Motors Shifts to Alternating Current

A PROGRAM OF CHANGE-OVER from direct current to alternating current for at least 90 per cent of its supply at the River Rouge plant has been instituted by the Ford Motor Company of Detroit. The undertaking involves about 30,000 motors totaling 70,000 hp. It is understood that relatively few slip-ring motors will be used, the great majority being either standard or high-slip, squirrel-cage motors. Several motor-generator sets are to be installed to supply the d.c. motors retained. A number of 3,000-kva., 13,200 to 440-volt substations will be installed for the a.c. supply.

Westinghouse Receives Hoover Dam Order

ANOTHER FORWARD STRIDE in the construction of the Boulder Canyon project was taken by the Six Companies, Inc., of San Francisco when it awarded to the Westinghouse Electric & Manufacturing Company the contract for the electrical construction equipment of the Hoover Dam, according to W. R. Marshall, vice-president of the Westinghouse company. A large part of the equipment covered by this huge contract will be built in the Oakland plant of the Westinghouse company.

The Six Companies award includes motors and control for driving all electric shovels, hoists, pumps, conveyors and compressors, also locomotives, switching equipment, circuit breaker, switchboards and transformers, lightning arresters and meters. Manufacture and delivery of this machinery will start at once.

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General Cable Earnings Down for Quarter

A NET LOSS OF $697,965 after interest, depreciation, etc., for the first quarter of the year, against a net loss of $487,253 for the first quarter of 1930, has been reported by the General Cable Corporation. The working capital position, the company states, has improved somewhat during the quarter owing to the liquidation of accounts receivable and inventories, but the volume of business was down sharply.

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PLANE EXPEDITES DELIVERY OF RUSH ORDERS

Master Electric Company, Dayton, employs this four-passenger monoplane to promote closer contact with customers and trade generally.

N.E.M.A. Issues Handbook on Transformer Operation

HIGHLY PRACTICAL INSTRUCTIONS for the care and operation of transformers are given in a booklet just issued by the National Electrical Manufacturers' Association. This is the fifth edition of this work and it has been carefully revised and edited so as to contain the latest available information. It will be found useful by electrical engineers, distribution superintendents, line foremen, electricians, operators, electrical students and all other persons responsible for the safe operation and the maintenance of transformers. The title of the booklet is "Instructions for Care and Operation of Transformers," revised April, 1931, and it supersedes the fourth edition of April, 1926.

The contents treat, among other things, of location, handling, inspection and storage of transformers. Drying coils and cores, sampling, testing and drying oil and filling transformers are important items described.

This handbook represents the recommendations of the transformer section of the National Electrical Manufacturers' Association, the member companies of which section produce the great preponderance of distribution and power transformers in the United States.

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Corcoran-Brown Adds Electrical Products

IN ORDER TO EXTEND its line of endeavor into the electrical field, including the manufacture of electrical switch boxes, meter cabinets, flood lamps and directional signals, the Corcoran-Brown Lamp Company has been formed through the merger of the Thomas J. Corcoran Lamp Company, Cincinnati; John Brown Manufacturing Company, Columbus, Ohio, and the Indiana Lamp Corporation, Connersville, Ind. G. P. Doll, president of the Thomas J. Corcoran Lamp Company, will be president of the combined companies, while Thomas W. Davidson, vice-president of the Cincinnati concern, also will be vice-president of the consolidated concern.

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Wood Pole Specifications

SPECIFICATIONS AND UNIFORM dimension tables for wood poles of lodgepole and Douglas fir will be developed by a committee working under the procedure of the American Standards Association. Work covering the same scope is nearing completion for poles of Western red cedar, Northern white cedar, chestnut, and Southern pine, and it is expected that the committee will follow the same lines in working out standards for wood poles of lodgepole and Douglas fir. The telephone group (the Bell Telephone System and the U. S. Independent Telephone Association) is sponsor for the work.

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Sampsell Urges Teamwork

IN ACCEPTING ELECTION to the presidency of the Society for Electrical Development Marshall E. Sampsell said:

"If the electrical industry, as a whole, is to live up to its deservedly enviable reputation for constructive upbuilding of American production and the promotion and development of electrical appliances designed profitably to afford convenience and satisfaction to the homes of America, it is essential that each of its major branches work wholeheartedly in sympathetic accord with the others, as well as with all merchandisers of acceptable labor-saving and convenience services.

"Close association with leaders earnestly devoted to this commendable task has convinced me there exists today a growing appreciation of the value of intelligent group teamwork. Complete co-operation and a better understanding of the problems of all concerned will effectively do the job."

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DELINQUENT ELECTRICAL ACCOUNTS

(National Electrical Credit Association)

Number of Accounts Reported

Division	March 1930	March 1931	Per Cent Inc. or Dec.	Three Months 1930	Three Months 1931	Per Cent Inc. or Dec.
New York	335	313	—6.6	991	815	—17.7
Middle & Southern Atlantic	204	145	—28.9	627	412	—34.2
New England	145	95	—34.4	385	286	—25.7
Central	842	675	—19.8	2,474	1,952	—21.0
Total	1,526	1,228	—19.5	4,477	3,465	—22.6

Total Amounts Reported

	March 1930	March 1931	Per Cent Inc. or Dec.	Three Months 1930	Three Months 1931	Per Cent Inc. or Dec.
New York	$54,058	$40,230	—25.5	$185,697	$115,909	—37.6
Middle & Southern Atlantic	33,720	23,560	—30.1	92,342	56,873	—38.4
New England	21,448	10,577	—50.6	62,667	26,395	—57.8
Central	113,822	64,225	—43.6	355,946	184,275	—48.2
Total	$223,048	$138,592	—37.8	$696,652	$383,452	—45.0

Copper Lowest in 37 Years

COPPER HAS SOLD throughout the last three days at 9 cents, delivered Connecticut, equalizing the all-time low set in 1894. Total sales for the week exceeded 8,000 tons, about half of which was at the 9-cent level. Shipments requested have been about equally divided over the next four months, though several hundred tons were also booked for September.

	April 29, 1931 Cents per Pound	May 6, 1931 Cents per Pound
Copper, electrolytic	9¼–9⅜	9
Lead, Am. S. & R. price	4	4
Antimony	6.80	6.70
Nickel, ingot	35	35
Zinc, spots	3.75	3.60
Tin, Straits	23.75	23.40
Aluminum, 99 per cent.	23.30	23.30

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Timken Engineering Journal

THE LATEST REVISED EDITION of the Timken Engineering Journal has just been issued. This publication contains information relative to methods of application, fitting practices, assembly methods, lubrication, etc. It is a comprehensive fund of information on all subjects relating to the installation and use of bearings gleaned from experience of more than 30 years in the manufacture and installation of roller bearings.

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TRADE BRIEFS

Consolidated Wire and Associated Corporations, manufacturers of wire specialties and jobbers of bare and insulated wires and cables, announce the removal of their factory, warehouse and office to 512 South Peoria Street, Chicago, Ill.

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The fourteenth annual meeting of the Electric Hoist Manufacturers' Association was held March 19, 1931, in New York City. The next meeting will be held in May. D. S. Brisbin, general manager of sales Chisholm-Moore Hoist Corporation, Tonawanda, N. Y., was elected chairman of the association and William White, Euclid Crane & Hoist Company, Euclid, Ohio, vice-chairman.

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General Refractories Company, has appointed the Davis Coal & Supply Company of Reading, Pa., as its distributor.

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Shepard Niles Crane & Hoist Corporation has changed its sales office in Pittsburgh to the Grant Building, also its sales office in Cleveland to 1433 East Twelfth Street.

Market Conditions

EASTERN district equipment business showed a substantial gain this week, central station and industrial orders both scoring improvement. Government demand continues to keep totals well up. Buying in the Southeast continues on a hand-to-mouth basis with orders relatively small.

——SMALL MOTOR BUSINESS ON THE PACIFIC COAST is running much better, but there are few large orders.

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EASTERN

—CONTRACTS FOR ELECTRICAL *equipment in the Eastern district have again scored a sizable gross total, duplicating a volume of commitments during a week in April, and showing definite tendencies of a trend to normal. The awards show a variety of demand both for central-station and industrial machinery, including prime movers; railway account is responsible for an order totaling $2,158,000, while foreign business is represented with an outlay of about $4,000,000.*

—WIRE AND CABLE *has registered a record commitment for an important transmission line. Government demand continues on a strong basis, and there is an encouraging tone in the outlook.*

Westinghouse Electric & Manufacturing Company has secured a contract for electrical construction equipment for the Hoover Dam, Boulder Canyon project of the government, including motors and controls for operating pumps, conveyors, shovels, hoists and similar equipment, also for electric locomotives, switching apparatus, circuit breakers, transformers, switchboards and instruments, meters, lightning arresters, etc. The award was made by Six Companies, Inc., general contractor for the hydro-electric power project. A considerable part of the equipment will be constructed at the Oakland, Calif., plant of the Westinghouse company. Another order obtained by the same manufacturer is from the Central Power & Light Company, San Antonio, Tex., for three vertical water-wheel generating units for its Eagle Pass hydro-electric power development now under way. The General Electric Company will build several turbo-generator units for the Soviet Russian government at its Lynn Works, the order being said to total $4,000,000.

United States Aluminum Company, an interest of Aluminum Company of America, has secured a large commitment from the New York Power & Light Corporation, covering about 34,000 miles of steel and aluminum wire to make approximately 900 transmission miles of 110,000-volt and 132,000-volt cable. The new transmission line will be built in Westchester County and north to a connection with the Niagara-Hudson power system. A central New York power company has placed an order with a state manufacturer for switchgear in amount of $55,000.

General Electric Company has been awarded an important contract for equipment for the new subway system in New York, totaling $2,158,000, deliveries to be carried out over a period of months. A steam railroad in Connecticut has placed an order for spare parts for electric locomotives with a New York maker, approximately $30,000. Westinghouse Electric & Manufacturing Company will furnish a switchboard to the United States Indian Service at Yakima, Wash. Eight bidders have tendered figures for an electric refrigerating plant for the government navy yard at Chelsea, Mass., the low bid being $11,185.

CONSTRUCTION PROJECTS

Signal Officer, Signal Corps, United States Army, Army Base, Brooklyn, N. Y., will receive bids until May 19 for 6,000 connectors, 450 mast plates and other equipment (Circular 145). Albany Port District Commission, Albany, N. Y., plans grain elevator to cost $1,800,000. Du Pont Celophane Company, Buffalo, N. Y., plans expansion program at transparent wrapping material plant to cost $1,500,000. University of Buffalo, Buffalo, N. Y., has filed plans for a power house to cost $400,000. Board of Education, New York, plans electrical shops in Franklin K. Lane high school, Brooklyn, including vocational department, to cost $2,500,000. Rensselaer Polytechnic Institute, Troy, N. Y., plans group of buildings to cost $1,175,000. United States Engineer Office, Buffalo, N. Y., will receive bids until May 14 for one 450-kw. Diesel engine generating set, complete with spare parts (Circular 129). Department of Public Works, Philadelphia, Pa., will receive bids until May 19 for electrical supplies. General Purchasing Officer, Panama Canal, Washington, D. C., will receive bids until May 13 for 200 transformers, 20 knife switches, cutouts, connectors and other electrical equipment (Schedule 2650); also, until May 21, for insulated cable, wire, watt-hour meters, condensers, switches and other electrical supplies (Schedule 2653).

NEW ENGLAND

—QUIET TONE IS REPORTED *in heavy electrical equipment fields, though one manufacturer notes interest in turbo-generators and heavy-duty motors for pumping and special purposes. On the other hand, small motors continue to sell in fair volume; single orders prevail. Interest in small switches and control is maintained and one manufacturer records little let-down in this line of equipment as compared with last month.*

Recently several interesting orders for motors for special machines were received. Fractional-horsepower motors for appliances are steady; marine requirements are less active. Line materials are moving more actively. One distributor reports pole line material orders, including cable, crossarms and wire, in good volume. Small orders for substation materials are more numerous according to one manufacturer. Spotty conditions are reported in transformers, though recently encouraging orders were received by one manufacturer.

CONSTRUCTION PROJECTS

United Electric Light Company, Springfield, Mass., has completed plans for power substation at East Springfield, reported to cost over $500,000. Massachusetts Institute of Technology, Cambridge, Mass., contemplates additional laboratory units to cost over $100,000. Cumberland County Power & Light Company, Portland, Me., contemplates hydro-electric power plant on Saco River, reported to cost over $400,000.

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SOUTHWEST

—NO LARGE CONTRACTS *reported closed during the past week. Power companies are apparently not breaking into their budgets to any extent.*

The laws recently passed by some states in this district forbidding merchandising by utilities have cut down the sale of electric appliances greatly. There are some fair-sized industrial jobs being considered and stock sizes are moving as per previous reports, about equally divided between utilities and industrials.

CONSTRUCTION PROJECTS

Rodney Milling Company, Kansas City, Mo., plans addition to grain elevator to cost over $175,000, with equipment. Kansas City Public Service Company, Kansas City, Mo., plans power substation and extensions in distributing lines to cost $85,000. Syms-Shafer Grocery Company, Colby, Kan., plans electric-operated cold storage and refrigerating plant to cost $60,000. Southwestern Engineering Company, Springfield, Mo., has plans under way for a grain elevator at Fort Worth, Tex., to cost over $250,000. Valley Sanitary Milk

Company, Mercedes, Tex., plans addition for ice cream manufacture to cost over $50,000. Slack Petroleum Company, Tulsa, Okla., has approved plans for an oil refinery at Longview, Tex., to cost $150,000.

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PACIFIC COAST

—SMALL VERTICAL MOTORS *for pumping equipment are running better. Recent price flurries such as the rigid iron conduit drop have produced considerable business.*

—THE BULK OF PRESENT *business is furnished by what may be described as long-distance jobs, such as wiring and street-lighting material for the town of Boulder City at the Hoover Dam site, including carloads of poles, one-half carload of wire and sufficient meters, transformers and street lights for the projected city of 6,000.*

The latest job almost ready for bidding comprises about 200 buildings and eleven hangars for the bombing base in Marin County, a $5,000,000 job to be completed in the next three years. Other prospective business includes 200 miles of emergency telephone wire for the United States Forest Service, a $25,000 traffic system including lights and cable for Santa Barbara, an elaborate lighting system for the swimming pools to be used in the tenth Olympiad at Los Angeles next year and a $20,000 lamp bid for the city and county of San Francisco, which is now up for decision. Actual orders include a $15,000 street-lighting award for San Francisco, a $4,000 award for another boulevard system, $9,000 worth of General Electric oil circuit breakers for Bay Shore installation and a $17,000 order for Westinghouse capacitors for power-factor correction for a Sierra dredging company.

Bids for assembling and installing hydro-electric machinery and equipment in the Diablo power house of Seattle's municipal lighting project, the work on which is estimated to cost between $250,000 and $300,000, are being taken by the Board of Public Works, Seattle, until May 15. Apparatus purchased several months ago includes two 66,700-kva. main generators, two 1,500-kva. house generators, four waterwheels, two 14-ft. butterfly valves and auxiliary equipment. An award for furnishing 34 automatic induction regulators for the Seattle Lighting Department has been awarded to Westinghouse for $48,280 and the Board of Public Works is now taking bids for seven motor-driven pumps, including one 60-hp. and six 10-hp. motors, for the Diablo power house. The Seattle Park Board is taking bids until May 14 for lighting system in Denny Blaine Park. Sales reported last week included one 300-hp. motor for a sawmill at Vancouver, Wash.; one 75-hp. hydro-electric plant in eastern Washington, one 25-hp. hydro-electric plant in Olympic peninsula district, eighteen motors from 25 hp. down to a sawmill and woodworking plant, 35 motors from 150 hp. down to scattered miscellaneous sources, 55 machines from 100 hp. down to scattered pulp and paper mills, canneries, refrigeration plants and dealers, a few transformers of small sizes and a few thousand dollars' worth of miscellaneous switchgear, the latter scattered in the Seattle, Tacoma, Portland and Vancouver, B. C. fields.

CONSTRUCTION PROJECTS

National Motor Inns, San Francisco, Calif., plans group of automobile service, repair and garage buildings in different cities to cost over $700,000. Braun Corporation, Los Angeles, Calif., has filed plans for chemical plant to cost over $175,000. Kirkland Packing Company, Kirkland, Wash., plans improvements in fruit packing plant to cost over $100,000. Barbee Drydock & Shipbuilding Corporation, Seattle, Wash., contemplates plant improvements to cost about $100,000. Southern Colorado Power Company, Pueblo, Colo., plans addition to power substation at Ordway, Colo., reported to cost $75,000.

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SOUTHEAST

—CONDITIONS IN THE *electrical field of the Southeast remain quiet, with purchases principally on a hand-to-month basis.*

A Georgia power company ordered last week 100,000 lb. of weatherproof solid copper wire and a Florida company ordered 20,000 lb. of No. 6 and No. 4 bare copper wire. Bids will be asked this week on approximately 8 miles of three-conductor, 300,000-circ. mil, type H paper and lead covered underground cable for 25,000-volt operation. An industrial in Tennessee has placed an order for a 5,000-kw, turbine, this being additional equipment rather than replacement, and a mining concern in the same state ordered $2,000 worth of bore hole cable. The U. S. penitentiary at Atlanta has asked bids on wire and cable in connection with the new textile unit, which equipment will amount to approximately $7,500 and probably will be ordered within two weeks. A Georgia power company has just completed a 52 days' campaign in which 2,633 ranges and 573 water heaters were sold, this being 106.8 per cent of the campaign quota.

CONSTRUCTION PROJECTS

Appalachian Electric Power Company, Charleston, W. Va., plans extensions in transmission lines from Richmond to Lynchburg, Va., and from Blue Ridge to Winchester, Va. Virginia & Pittsburgh Coal & Coke Company, Fairmont, W. Va., plans coal tipple at Kingmont, W. Va., to cost over $75,000. United States Veterans Bureau, Washington, D. C., has plans under way for a power plant and other structures at veterans' hospital at Oteen, N. C., to cost $600,000. Dixie Glass Bottle Manufacturing Company, Jackson, Miss., has approved plans for glass container plant reported to cost over $85,000.

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MIDDLE WEST

—VERY LITTLE, IF ANY, CHANGE *in general business is observed this week in the Middle West section. While it is believed that some improvement is being made, the change for the better is so slight that it appears negligible.*

—THE MAJOR ACTIVITIES *are in much the same position as last week, with very little prospect for improvement in view.*

Industrial activity continues quite spotty, although a slight gain in employment is observed. The pessimistic feeling which was quite prevalent toward the close of last month seems to have died down somewhat and a feeling of relief that another month is over is taking its place. An increase in the number of cars handled by the railroads is taken as a favorable sign of an increasing demand for all commodities. The consensus of opinion seems to be that this month should show an improvement in general business. The various utility companies are buying normally for their immediate needs. Some of the interesting items placed this week include contract for extension to 66-kv. transmission terminal, one 1,575-kva., 12,000-volt, three-phase, 60-cycle, oil-insulated, self-cooled transformer, 285 Thompson meters, 10 to 50 amp. capacity, and several construction orders aggregating $50,000.

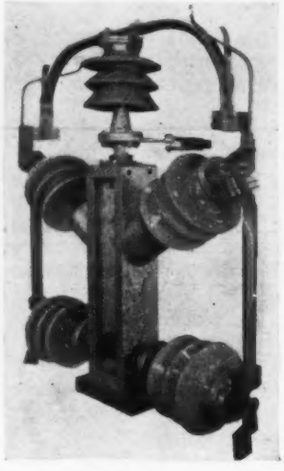
CONSTRUCTION PROJECTS

Wisconsin Power & Light Company, Madison, Wis., will build transmission line from Fond du Lac to Janesville, Wis. Ford Motor Company, Dearborn, Mich., will establish fabric mill at Ypsilanti, Mich., to cost over $250,000. Michigan Gas & Electric Company, Three Rivers, Mich., plans extensions and improvements in power station at Marquette, Mich., to cost $150,000. F. J. Bittermann Steel Products Company, Joliet, Ill., contemplates plant addition to cost over $100,000. Bell & Howell Company, Chicago, Ill., will build addition to motion-picture machine manufacturing plant to cost over $85,000. C. C. Shipp, 230 East Ohio Street, Indianapolis, Ind., will receive bids until May 15 for construction of a hydro-electric power plant on Flat Rock River, Shelby County, including two water turbines, two generators, headgates and complete auxiliary equipment. Contracting Officer, Air Corps, United States Army, Wright Field, Dayton, Ohio, will receive bids until May 18 for 143 electric drills (Circular 284). City Council, St. Paul, Minn., will soon call for bids for ornamental lighting.

New Equipment Available

Gang-Operated Disconnect Lowers Insulator Needs

A GANG-OPERATED DISCONNECTING and air break switch has been announced by the Champion Switch Company, Kenova, W. Va. This combination is normally installed over an oil circuit breaker for disconnecting the breaker and shunting the line to an auxiliary



bus. The design saves two insulators per pole over the usual arrangement of switches required for the same service. The insulator units of the air break blades at the top are interlocked and simultaneously operated by a common handle. The six disconnecting switch blades, mounted on the side, are interlocked and operated by one handle. Interlocks are furnished so that the air break and disconnecting switch blades cannot be opened at the same time.

All bearings are made of non-ferrous metal, the balls being of bronze and the ball races of monel. The switches are shipped completely assembled, ready for immediate installation.

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A CABLE FOR UNDERGROUND WORK in ducts or for burial directly in the ground has been announced by the Okonite Company, Passaic, N. J., under the trade name "Okosheath." The construction is simple, the conductor being covered with a single thick sheath of tough rubber compound which provides the required insulation, excludes moisture, cushions the conductor from impact, resists abrasion and is, inherently, impervious to the action of chemicals. A lineman can splice this cable with his accustomed tools. Its low initial cost, light weight, cleanliness, the ease of splicing and its flexibility are urged as opportunities for the economical expansion of underground distribution areas. It is supplied in single conductor only for 600-volt service in sizes from No. 14 AWG to 2,000,000 circ.mil.

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A WELDED STEEL MOTOR BASE of one-piece construction has been announced by the Lincoln Electric Company, Cleveland. These new bases are designed to be used instead of slide rails. They are constructed of rolled steel angles and flat bar stock fused into one homogeneous unit by the electric arc. The flanges of the angles to which the motor is bolted are slotted to permit moving the motor on the base for the purpose of tightening the drive belt. At one end a screw adjustment is provided for moving the motor.

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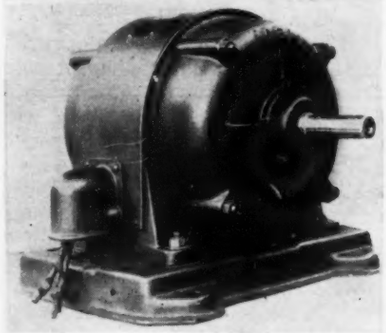
Drip-Proof Motor Protected Against Liquids

A DRIP-PROOF MOTOR which is protected against water or other liquids dripping on it or splashed in through the ends has been announced by the Ideal Electric & Manufacturing Company, Mansfield, Ohio. Its action as water is thrown into the motor is immediately to discharge it through the vent at the bottom of the center inclosing jacket. Air circulation is from both ends toward the center and out through this vent.

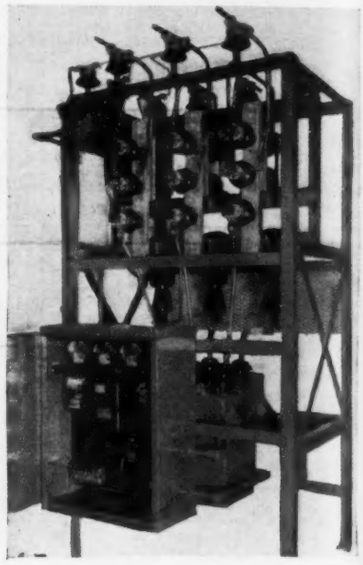
Large shrouded fans located just inside the end brackets at each end of



the motor produce the action which discharges the water. These fans catch any water entering through the end of the motor and throw it against the inside surface of the bearing brackets and out through the center bottom vent without coming in contact with the windings.

7,500-Volt, Single-Circuit Outdoor Switching Unit

A SINGLE-CIRCUIT outdoor substation switching unit for 7,500-volt service, factory built, completely assembled, wired and tested, has been developed by the Westinghouse Electric & Manufacturing Company. The unit consists of a welded steel structure in which is mounted one outdoor oil circuit breaker,



type FO-22, six disconnecting switches with by-pass arrangement, current and potential transformers and an outdoor weatherproof sheet steel relay and meter house. Two or more of these units, complete with an interconnecting bus, can be mounted side by side for controlling a multitude of circuits. The substation is available in 400, 600 and 800 amp. capacities.

The circuit breaker is solenoid-"Rectox" a.c.-operated and has an interrupting capacity of 45,000 kva. at rated voltage. The closing source required is 230 volts, 60 cycles, and the tripping is obtained by means of CO relays and direct trip attachments.

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A METER-TESTING ACCESSORY in the form of a compact little fuse holder for use in conjunction with potential test leads has been announced by the Meter Devices Company, Canton, Ohio. The entire device is $\frac{3}{4}$ in. in diameter and 3 in. long and consists of a hollow fiber tube which serves as a protection to the glass fuse and solderless terminals and fuse holders. By means of the solderless terminals, it may be inserted into the lead in a few minutes without the use of any tools other than a knife for skinning the wire of insulation.